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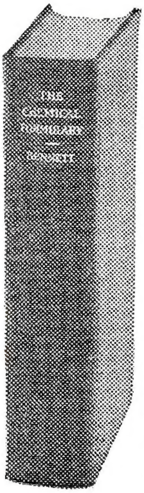

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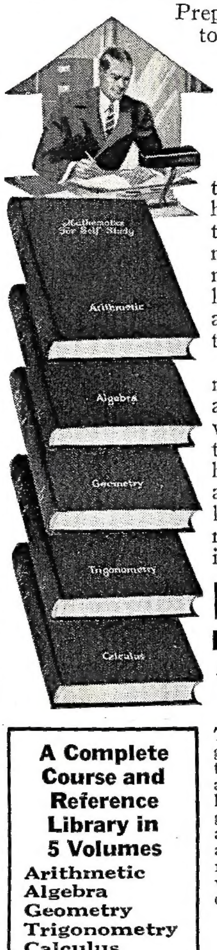

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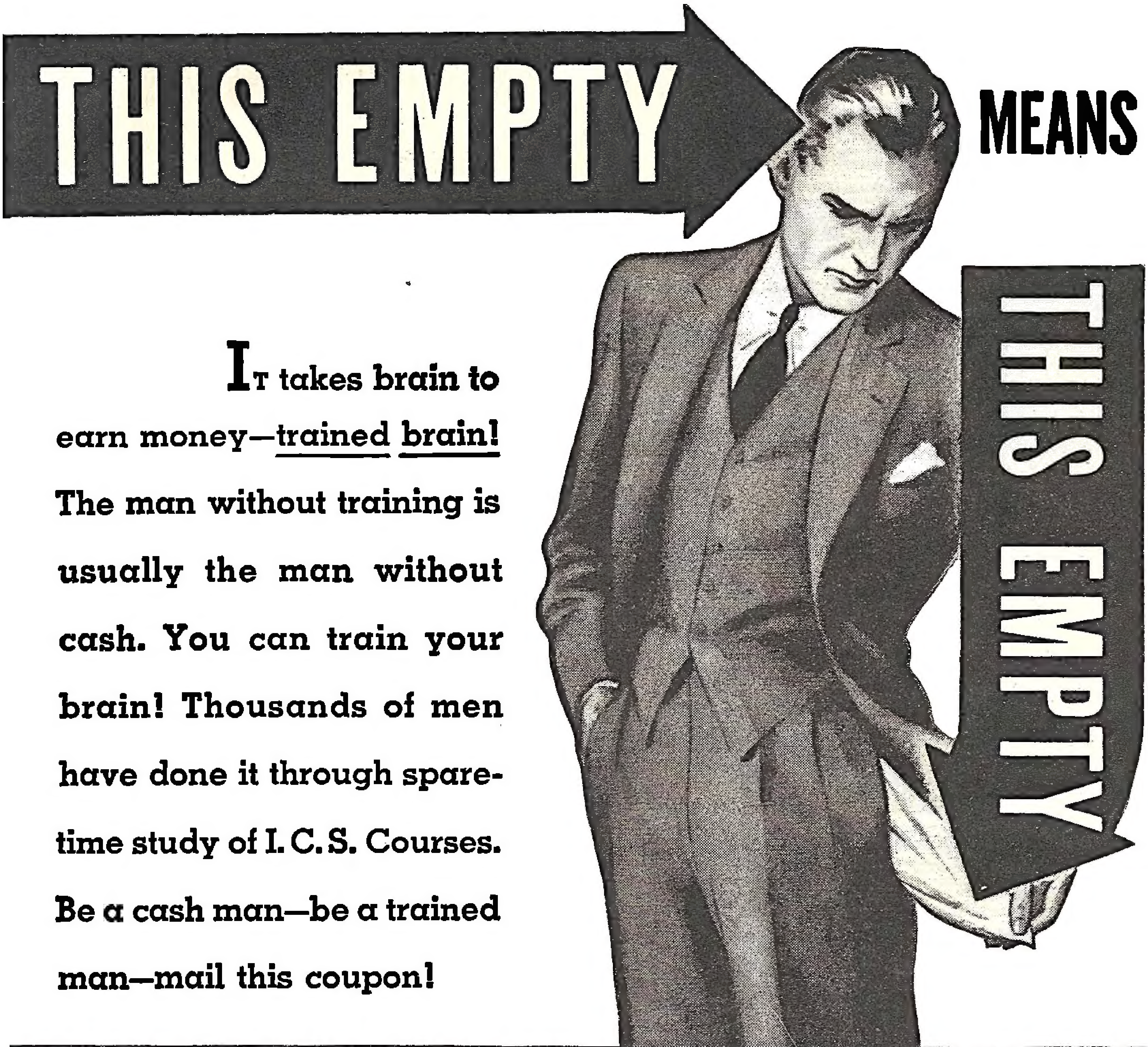

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FEBRUARY
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Volume XVII
Number 4

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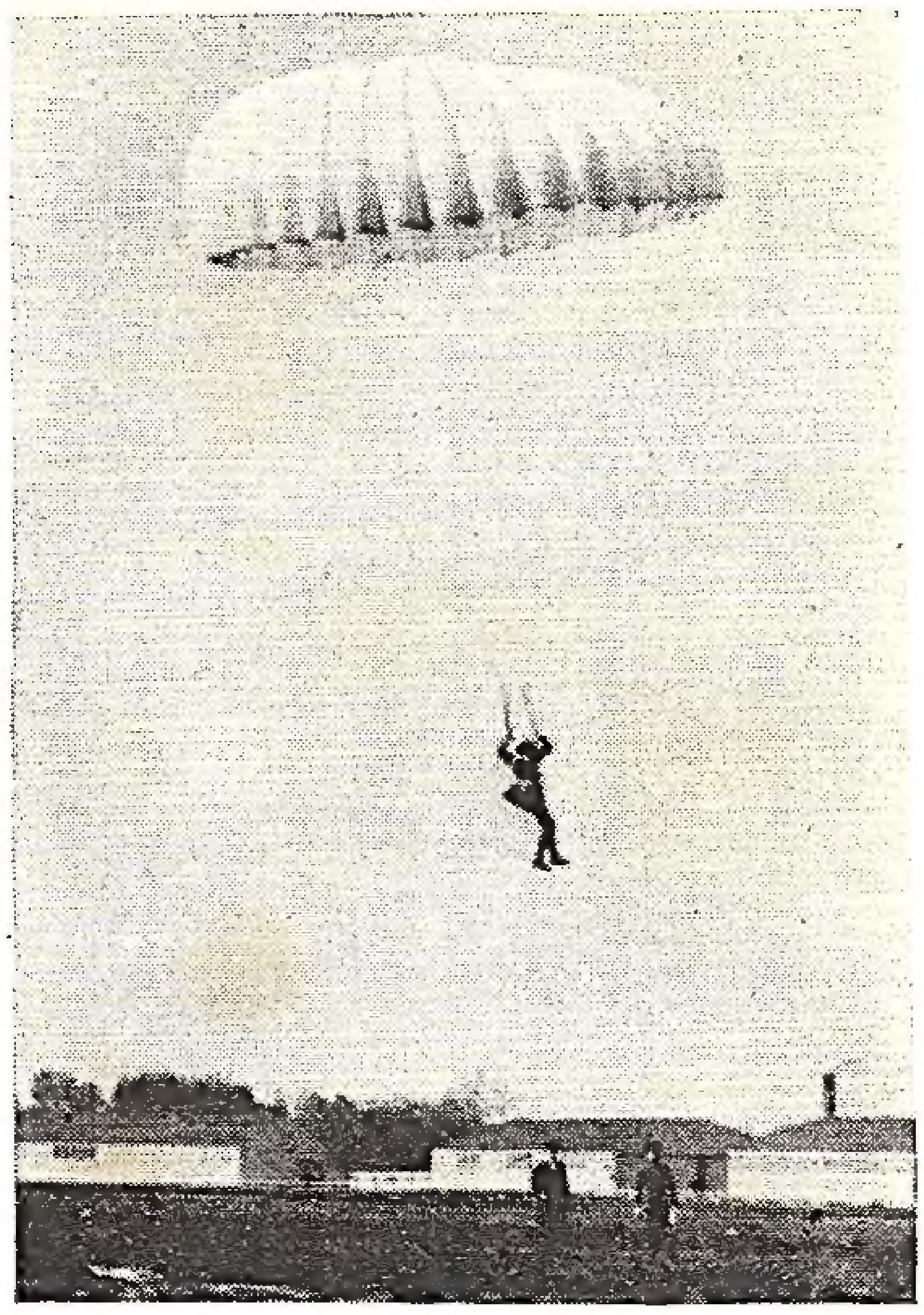

Pilots throughout the world regard Leslie Irvin as their guardian angel. As a boy, Irvin experimented with crude umbrellas, making jumps from the roofs of neighboring barns. Today, he is known as the "Parachute King" and his factories supply most of the chutes used by airmen of many nations. Irvin was first to foresee the possibilities of equipping regiments of soldiers with chutes and dropping them behind enemy lines, a practice now universally recognized as an important factor in military strategy. Read the fascinating story of Irvin and his part in the development of the parachute in the March issue.

FOR WORKSHOP FANS

Among the many interesting projects included in the March issue will be the first installment of Building Midget Mike, an 00-gauge miniature locomotive, How To Bind Your Own Books, a novel Scotty dog radio, lathe projects, and many other workshop plans, suggestions and time saving kinks.

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1935
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Ordinarily, there would be plenty of men to fill these jobs—men in junior positions who had been studying in spare time. But most men have been letting their training slide during these dark years of depression . . . "What's the use?"—You have heard them say. Perhaps there has been some excuse for sticking to any old kind of a job one could get the past few years—but the door is wide open for the man with ambition and ability *NOW!*

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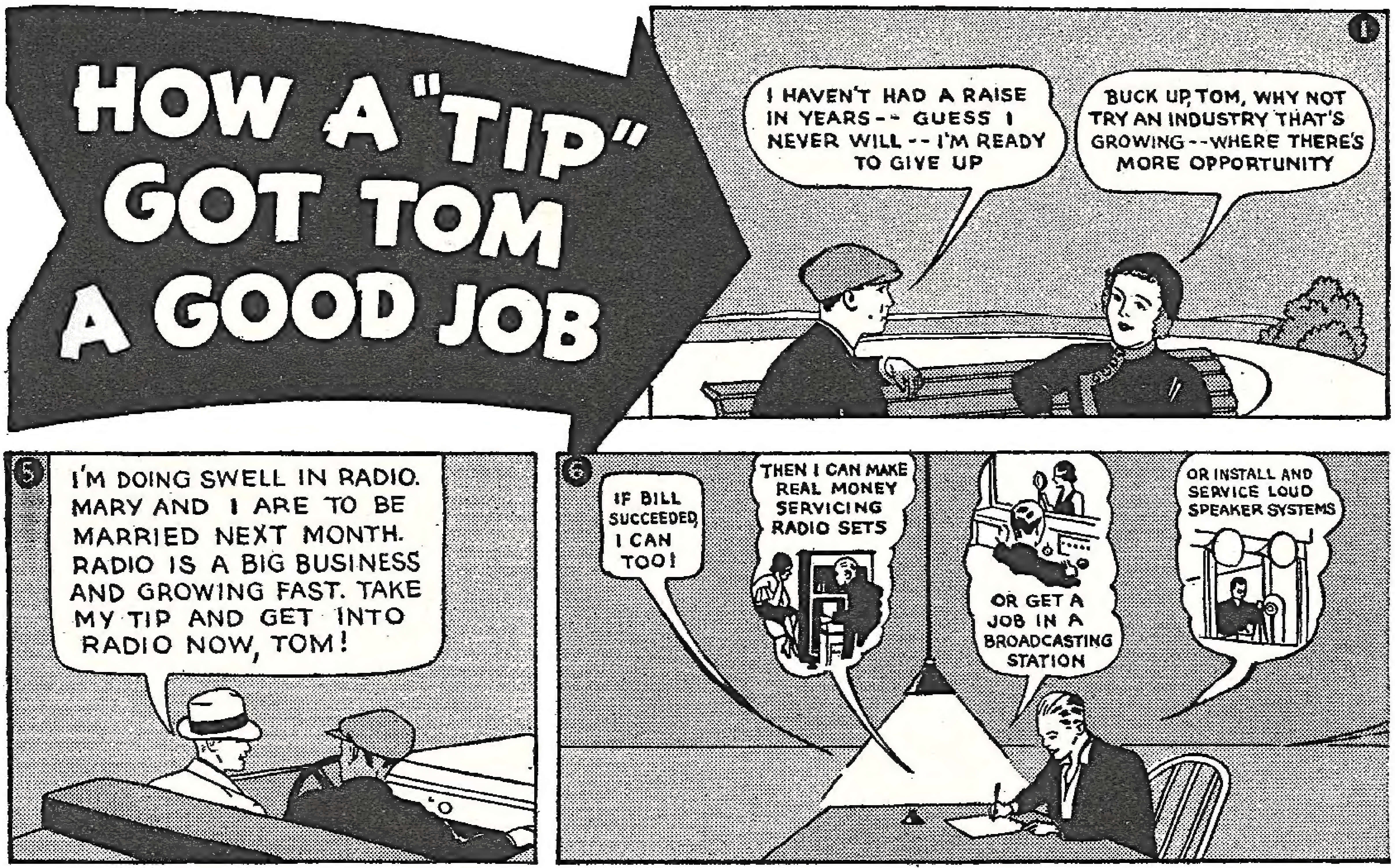
HOW A "TIP" GOT TOM A GOOD JOB
1
I HAVEN'T HAD A RAISE IN YEARS -- GUESS I NEVER WILL -- I'M READY TO GIVE UP
BUCK UP, TOM, WHY NOT TRY AN INDUSTRY THAT'S GROWING -- WHERE THERE'S MORE OPPORTUNITY
5
I'M DOING SWELL IN RADIO. MARY AND I ARE TO BE MARRIED NEXT MONTH. RADIO IS A BIG BUSINESS AND GROWING FAST. TAKE MY TIP AND GET INTO RADIO NOW, TOM!
6
IF BILL SUCCEEDED, I CAN TOO!
THEN I CAN MAKE REAL MONEY SERVICING RADIO SETS
OR GET A JOB IN A BROADCASTING STATION
OR INSTALL AND SERVICE LOUD SPEAKER SYSTEMS

I will train YOU too at Home in Spare Time for Good Jobs in Radio

J. E. Smith, President National Radio Institute
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Makes $50 to $60 a Week

"I am making between $50 and $60 a week after all expenses are paid and I am getting all the Radio work I can take care of, thanks to N. R. I." H. W. SPANGLER, 308 Walnut St., Knoxville, Tenn.

Operates Public Address System

"I have a position with the Los Angeles Civil Service, operating the Public Address System in the City Hall Council. My salary is $153 a month." R. H. ROOD, R. 136, City Hall, Los Angeles, Calif.

Do you want to make more money? Radio offers you many opportunities for well-paying spare time and full time jobs. And you don't have to give up your present job or leave home and spend a lot of money to become a Radio Expert.

Many Radio Experts Make $30, $50, $75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Spare time Radio set servicing pays as much as $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as $30, $50, $75 a week. Many Radio Experts operate their own full time or part time Radio sales and service businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio, and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I have trained are holding good jobs in these branches of Radio. Read their statements. Mail the coupon.

There's a Real Future in Radio for Well Trained Men

Radio already gives jobs to more than 300,000 people. In 1935 over $300,000,000 worth of sets, tubes and parts were sold—an increase of 20%

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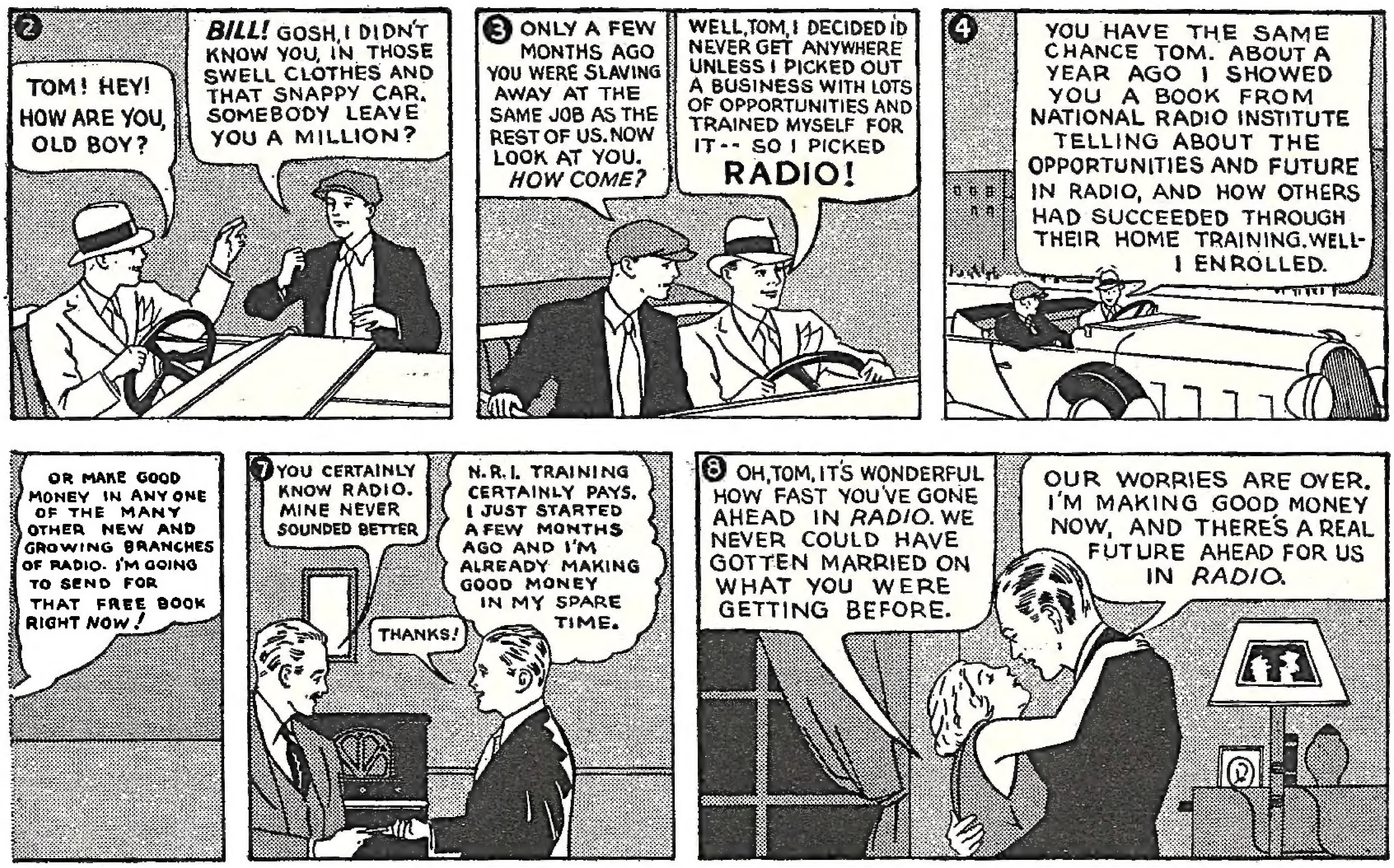
2
TOM! HEY! HOW ARE YOU, OLD BOY?
BILL! GOSH, I DIDN'T KNOW YOU, IN THOSE SWELL CLOTHES AND THAT SNAPPY CAR. SOMEBODY LEAVE YOU A MILLION?
3
ONLY A FEW MONTHS AGO YOU WERE SLAVING AWAY AT THE SAME JOB AS THE REST OF US. NOW LOOK AT YOU. HOW COME?
WELL, TOM, I DECIDED I'D NEVER GET ANYWHERE UNLESS I PICKED OUT A BUSINESS WITH LOTS OF OPPORTUNITIES AND TRAINED MYSELF FOR IT -- SO I PICKED RADIO!
4
YOU HAVE THE SAME CHANCE TOM. ABOUT A YEAR AGO I SHOWED YOU A BOOK FROM NATIONAL RADIO INSTITUTE TELLING ABOUT THE OPPORTUNITIES AND FUTURE IN RADIO, AND HOW OTHERS HAD SUCCEEDED THROUGH THEIR HOME TRAINING. WELL- I ENROLLED.
OR MAKE GOOD MONEY IN ANY ONE OF THE MANY OTHER NEW AND GROWING BRANCHES OF RADIO. I'M GOING TO SEND FOR THAT FREE BOOK RIGHT NOW!
7
YOU CERTAINLY KNOW RADIO. MINE NEVER SOUNDED BETTER
THANKS!
N.R.I. TRAINING CERTAINLY PAYS. I JUST STARTED A FEW MONTHS AGO AND I'M ALREADY MAKING GOOD MONEY IN MY SPARE TIME.
8
OH, TOM, IT'S WONDERFUL HOW FAST YOU'VE GONE AHEAD IN RADIO. WE NEVER COULD HAVE GOTTEN MARRIED ON WHAT YOU WERE GETTING BEFORE.
OUR WORRIES ARE OVER. I'M MAKING GOOD MONEY NOW, AND THERE'S A REAL FUTURE AHEAD FOR US IN RADIO.

over 1934! Over 1,100,000 auto Radios were sold in 1935, 25% more than in 1934! 22,000,000 homes are today equipped with Radios, and every year millions of these sets go out of date and are replaced with newer models. Millions more need servicing, new tubes, repairs, etc. Broadcasting stations pay their employees (exclusive of artists) more than $23,000,000 a year! And Radio is a new industry, still growing fast! A few hundred $30, $50, $75-a-week jobs have grown to many thousands in less than 20 years.

Many Make $5, $10, $15 a Week Extra In Spare Time While Learning

Practically every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs that you can cash in on quickly. Throughout your training I send you plans that made good spare time money—$200 to $500 a year—for hundreds of fellows. My training is famous as "the Course that pays for itself."

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My Course is not all book training. I send you special Radio equipment and show you how to conduct experiments and build circuits which illustrate important principles used in modern Radio receivers, broadcast stations and loud speaker installations. I show you how to build testing apparatus for use in spare time work from this equipment. Read about this 50-50 method of training—how it makes learning at home interesting, quick, fascinating, practical. Mail coupon.

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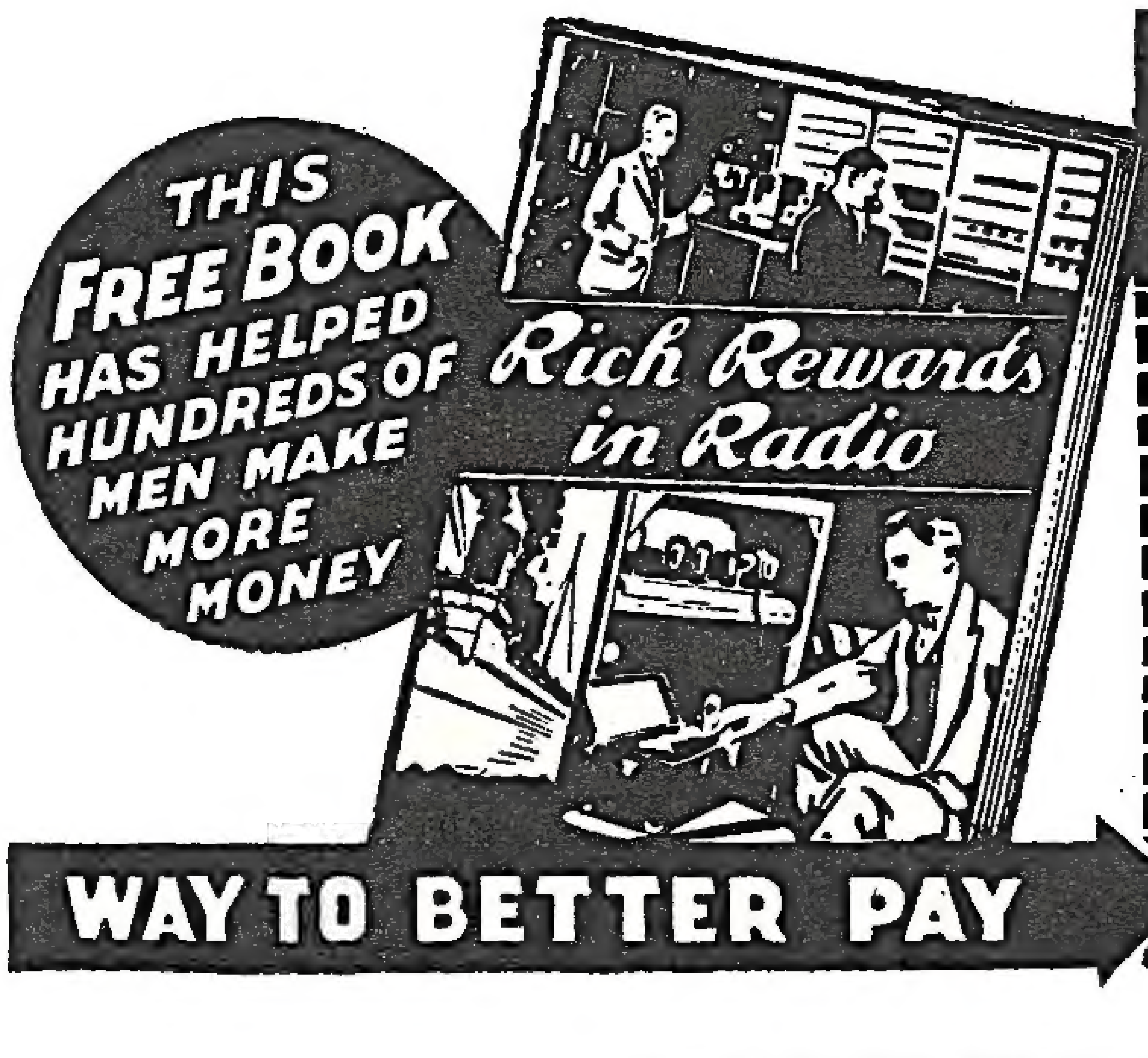
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Rich Rewards in Radio
WAY TO BETTER PAY

This Coupon is Good For One FREE Copy of My Book

J. E. SMITH, President, Dept. 7BH,
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send "Rich Rewards in Radio," which points out the spare time and full time opportunities in Radio and explains your 50-50 method of training men at home in spare time to become Radio Experts. (Please Write Plainly.)

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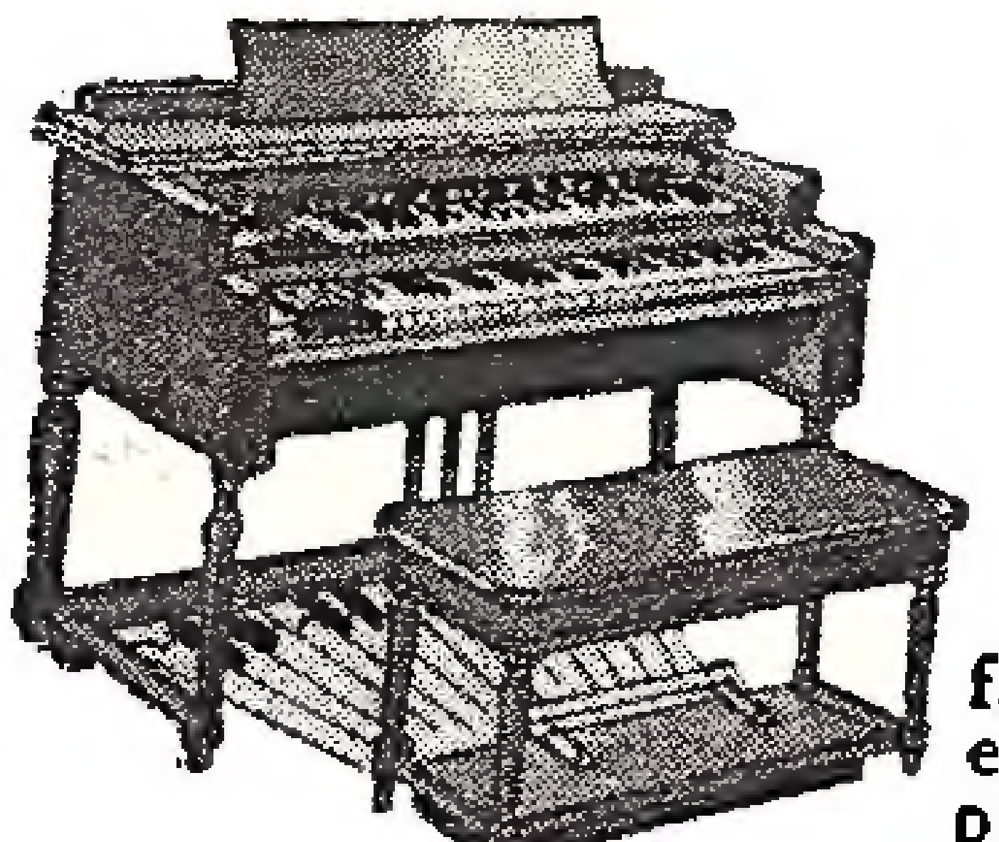
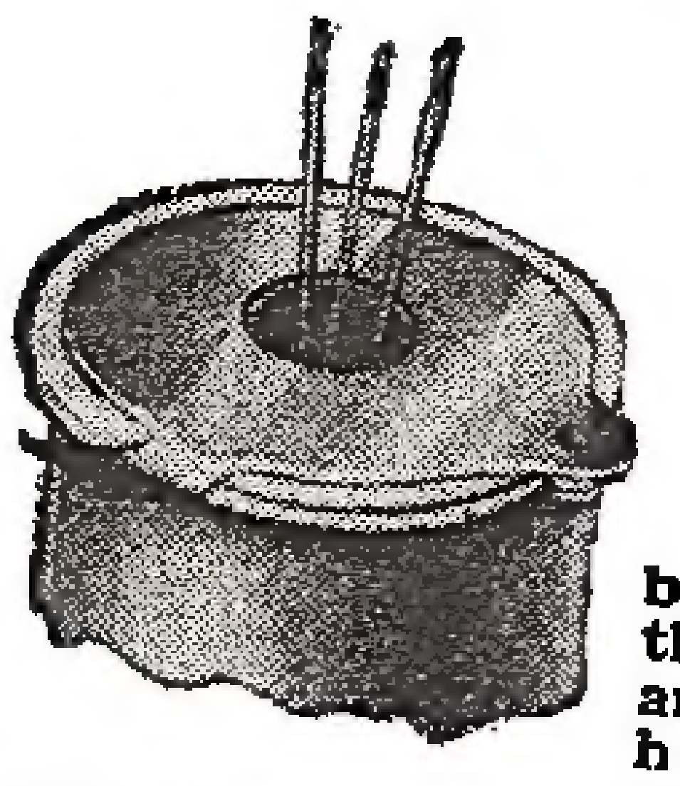
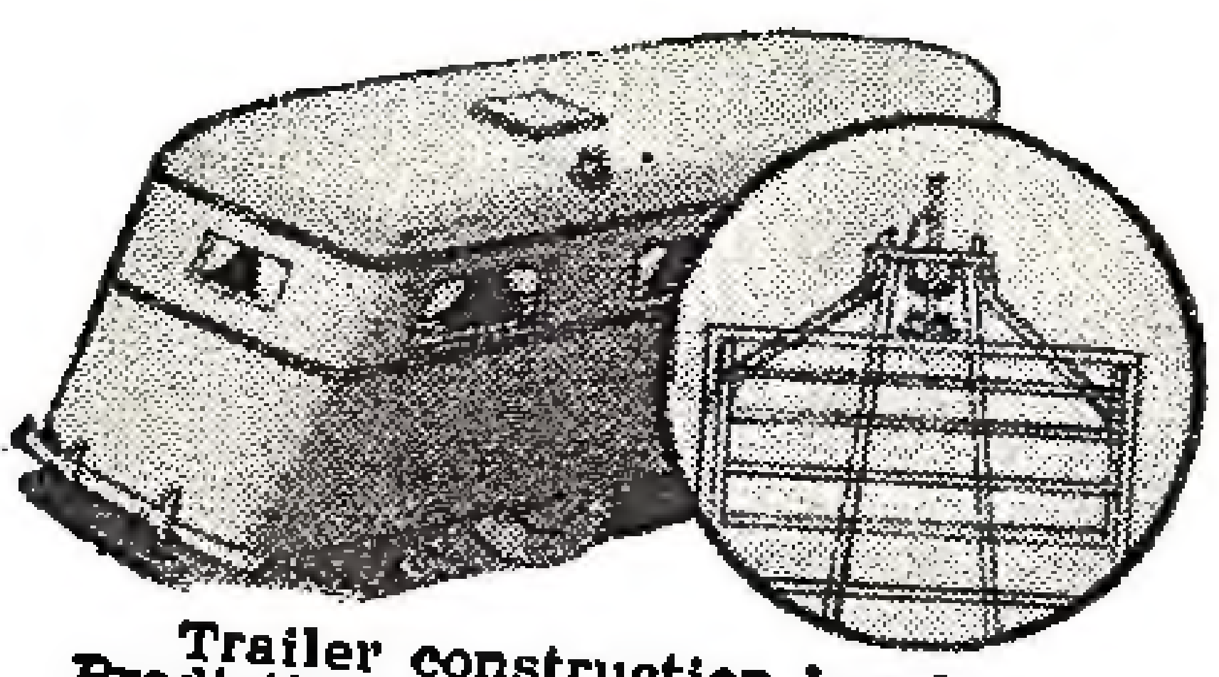
INVENTORS' FOR THE YEAR



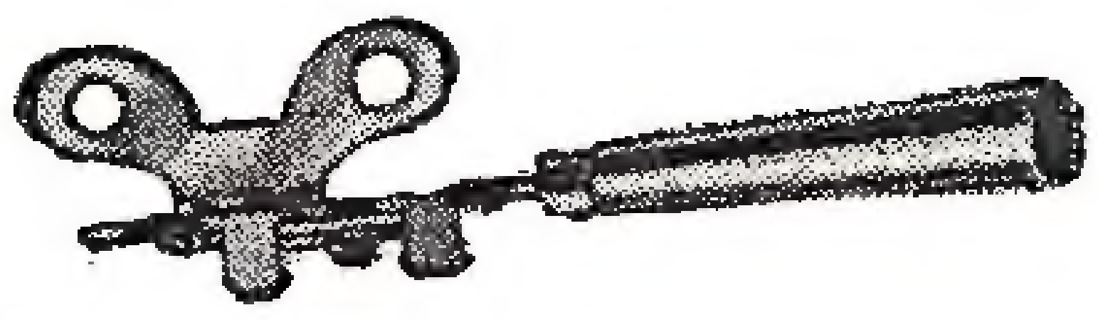
Here's the famous new electric organ, patented by John Hays Hammond, Jr. Contains no pipes. Creates musical tones electrically. Connects to ordinary light socket. Smaller and lighter than an upright piano. Said to produce more than two hundred and fifty million different musical effects.



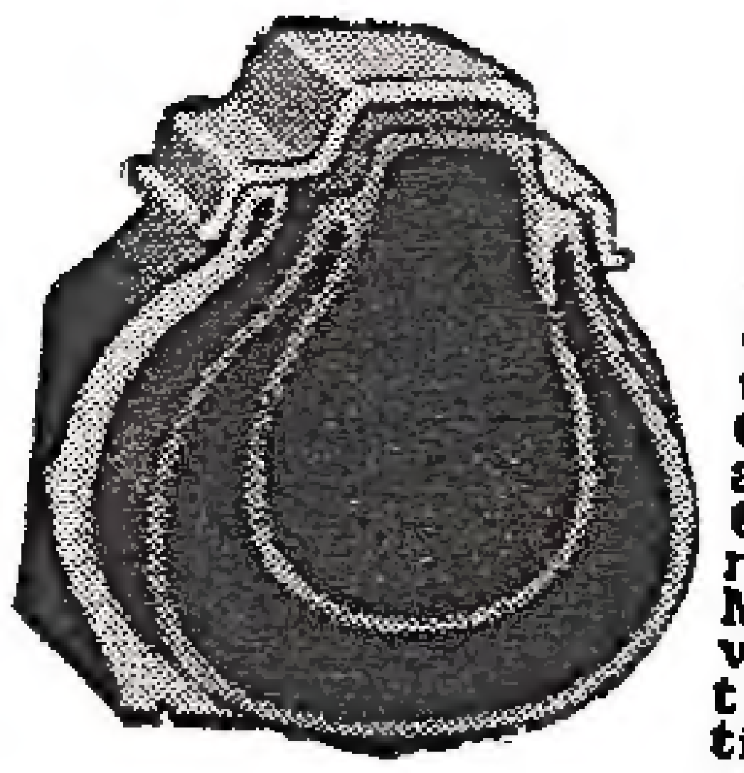
This combination thread-cutter and needle-holder, recently patented, may prove a boon to busy housewives, and it clearly shows what a field there is for handy household inventions. With this device, the needles are always right where you want them, and the thread is easily cut off without tangling or ravelling.



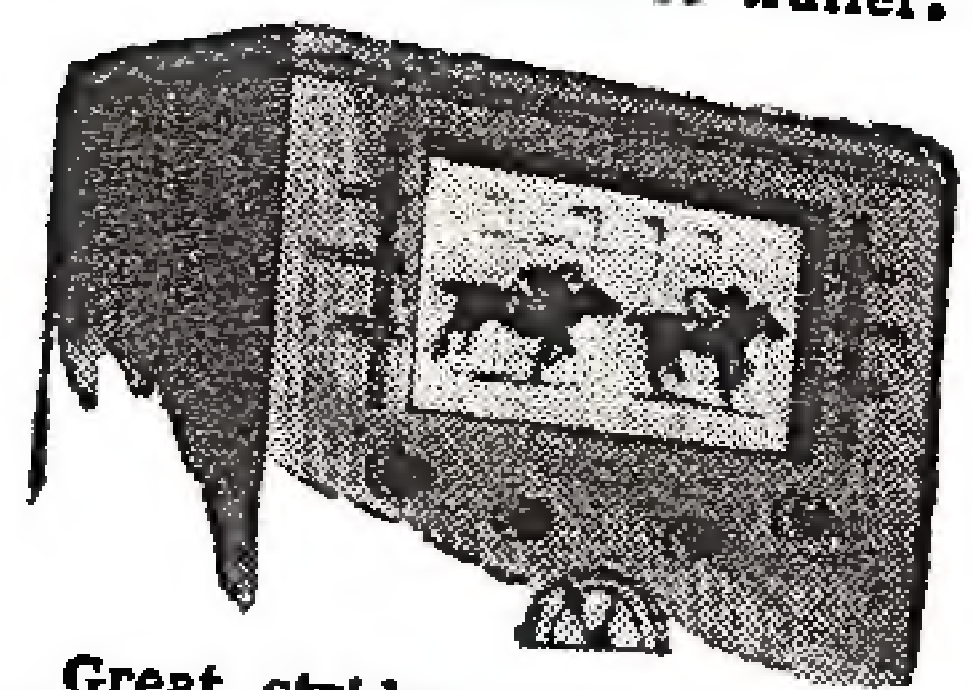
Trailer construction has boomed. Predictions are that soon millions will be living and traveling in trailers. Inset shows a special type of trailer brake mechanism (Manufactured by Wood-Owen Trailer Co.). When driver of automobile applies brakes, brakes are automatically applied to trailer.



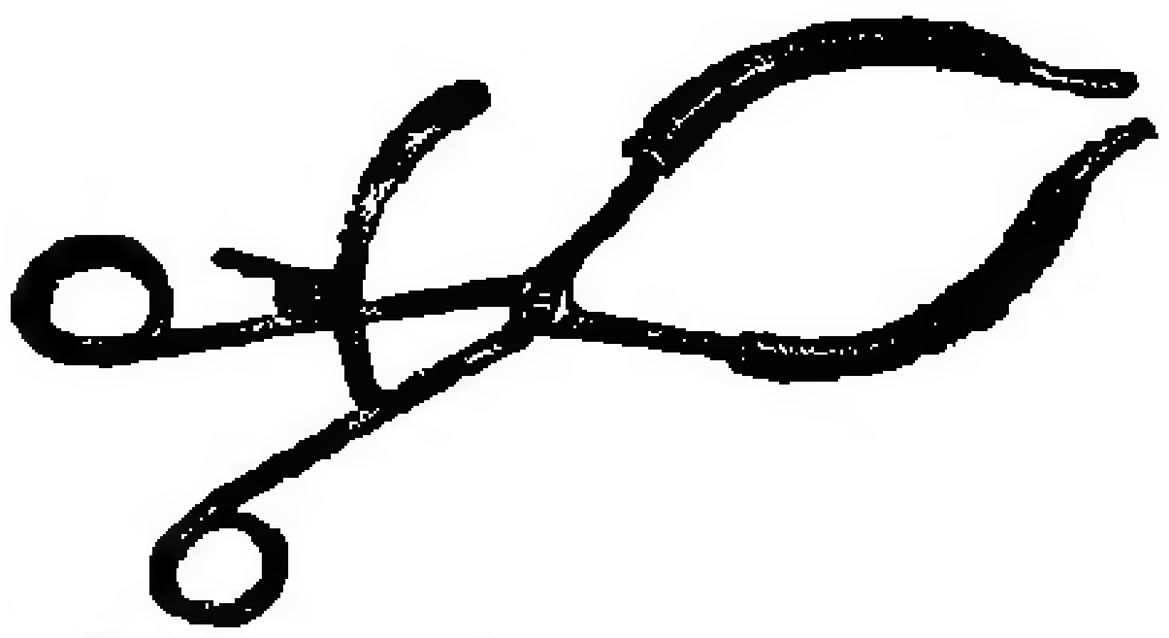
Numerous inventions relating to the home, simple gadgets for everyday use, are constantly being improved. Even such a commonplace article as the can opener affords room for improvement in construction. Shown is one patented this past year by Melvin Higgs, Pomona, California.



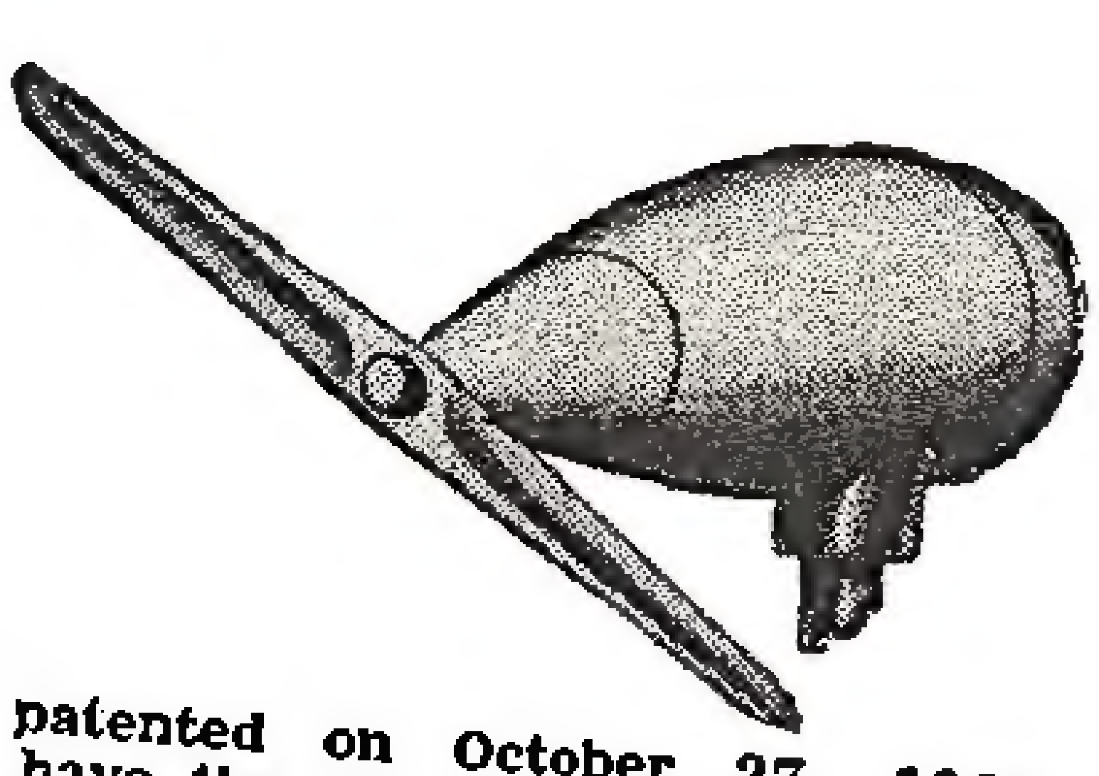
Many advances have been made in tire construction. Shown is a new Life Guard Tube introduced by Goodyear. Has a secondary tube within the main tube. Many other developments in tire construction have taken place.



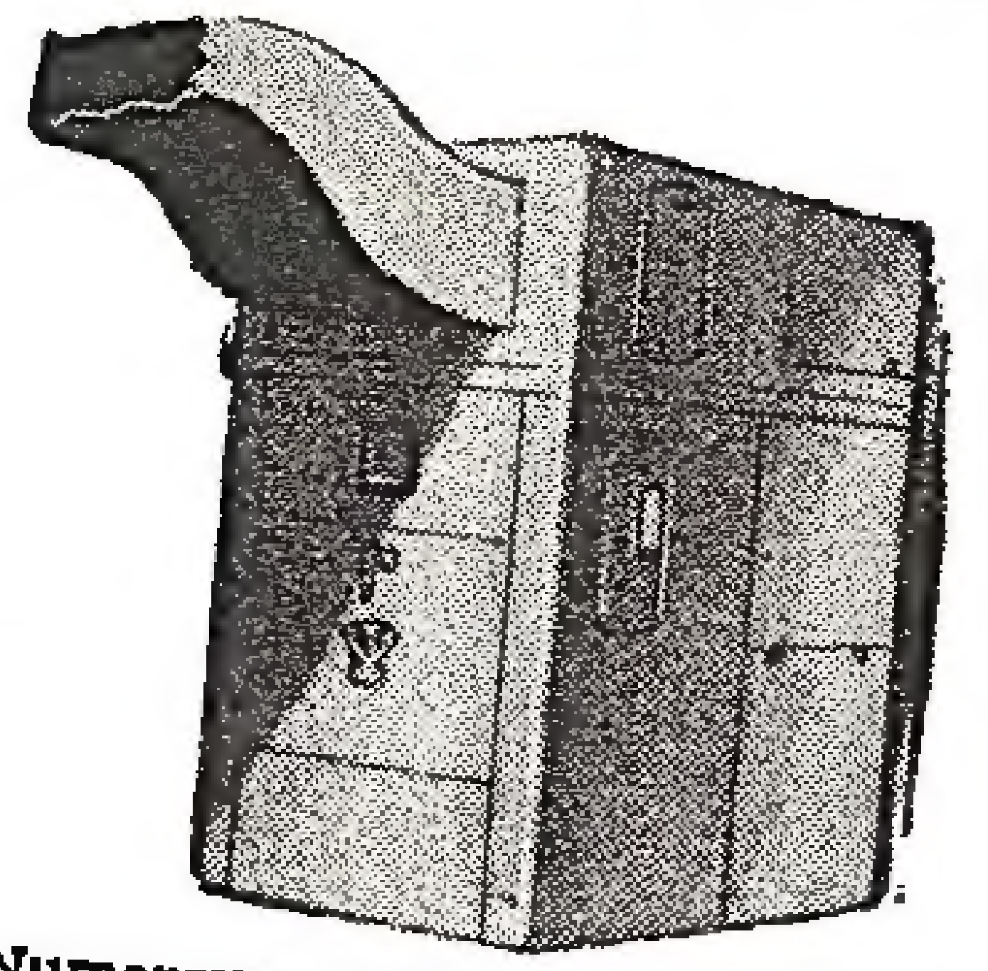
Great strides made in television, with several practical sets for home reception demonstrated in New York and elsewhere.



Advancement has been made in the field of first aid and medical equipment. Here is a simple operating tourniquet which can be instantly applied to stop the flow of blood from an injured member of the body. Permits application of pressure and may be released instantly or gradually.

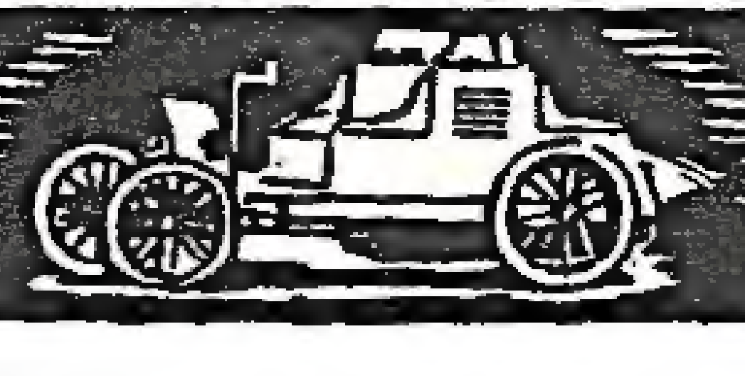


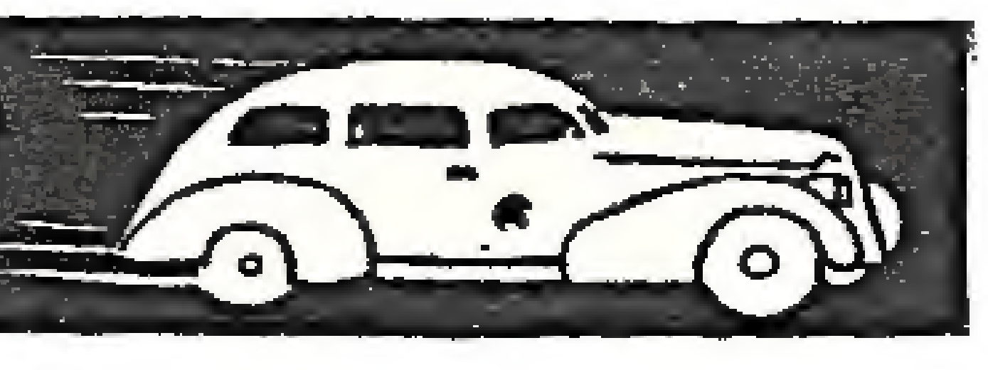
Electricity for the farm: Here is a novel wind-generator, patented on October 27, 1936, which may have the effect of bringing cheap electric power to thousands of isolated farms and homes. It heads into the wind automatically and has an automatic governor.



Numerous patents have been taken out in Air Conditioning. It is predicted that homes, office and factory buildings and all forms of travel conveyances will be air conditioned.

FROM 1898 TO 1937





THESE INVENTIONS HELPED MAKE THE HISTORY OF 1936—1937 WILL WELCOME AND REWARD THE SAME SPIRIT OF PROGRESS

Television and trailers—simple household devices—all helped make inventive history during 1936. Invention marches on in every field, in every sphere of human life. Hard times are leaving, prosperity returning. Men are going back to work. Times are changing—getting better. We believe that 1937 will be a good year for worthwhile inventions.

Look Around—Look Ahead

At the recent Centennial Celebration of the American Patent System an old letter of Andrew Carnegie's was reproduced, in which he spoke of his 1905 Winton Automobile. Mr. Carnegie said: "There may be improvements yet to come, but it is difficult to see room for them". Think of it! Difficult to see any room for improvement on a 1905 "chuggamobile". The truth is the 1937 automobile contains **more than 100,000 patented improvements**. There is always room for improvement. Men who look around, then **look ahead** can help the world and help themselves by developing worthwhile inventions.

Your Idea May Be A Good One

If you have been looking around—looking ahead—you may have a worthwhile idea. It may be for the house, the farm, the shop; for some new method or some new composition. And if it is worthwhile—if it is practical and new—it may be worth patenting.

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CALENDAR

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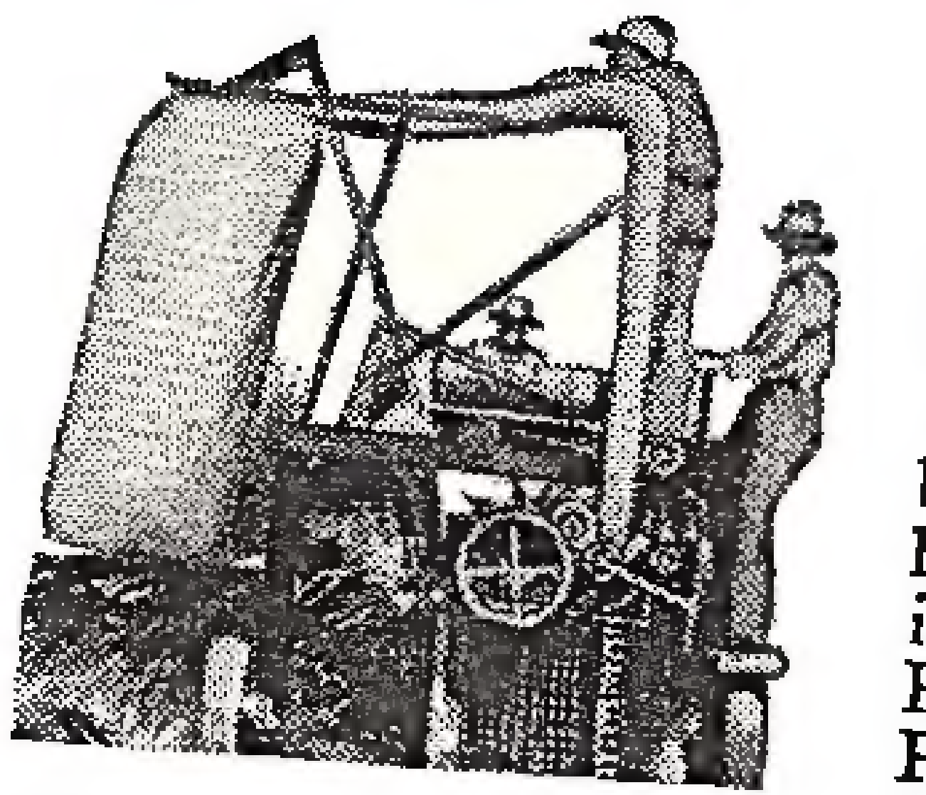
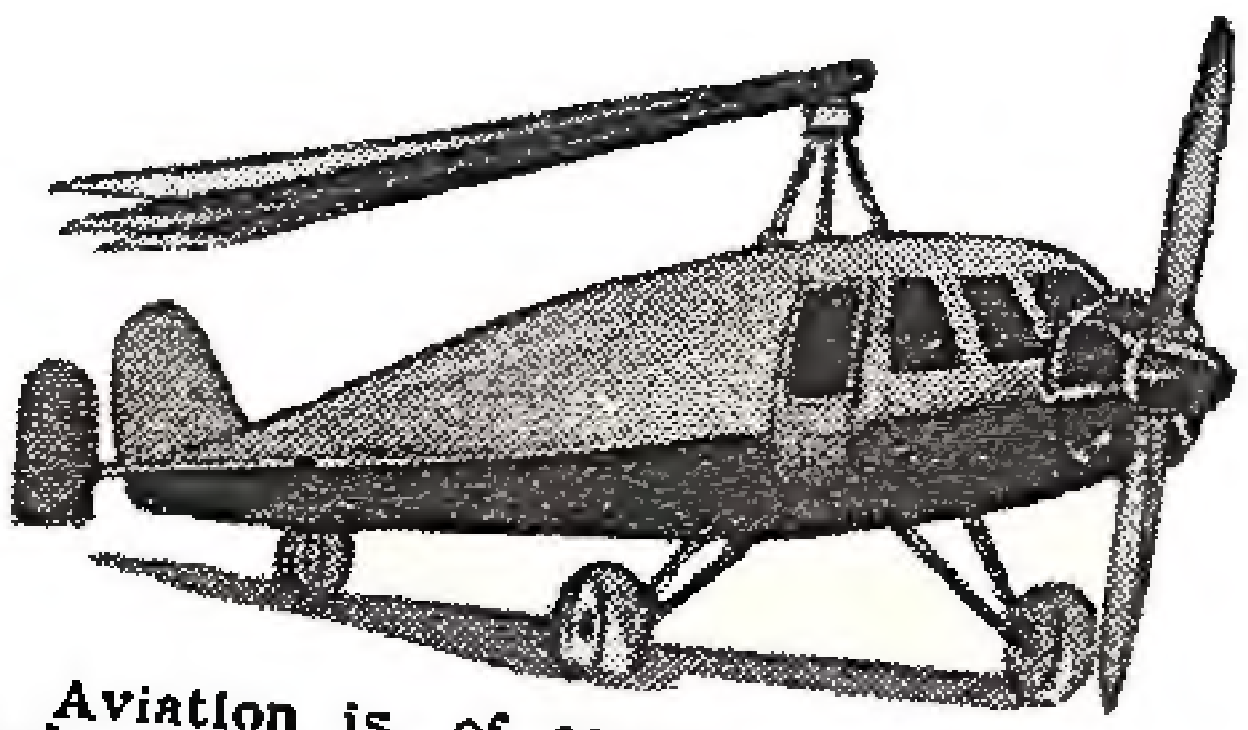
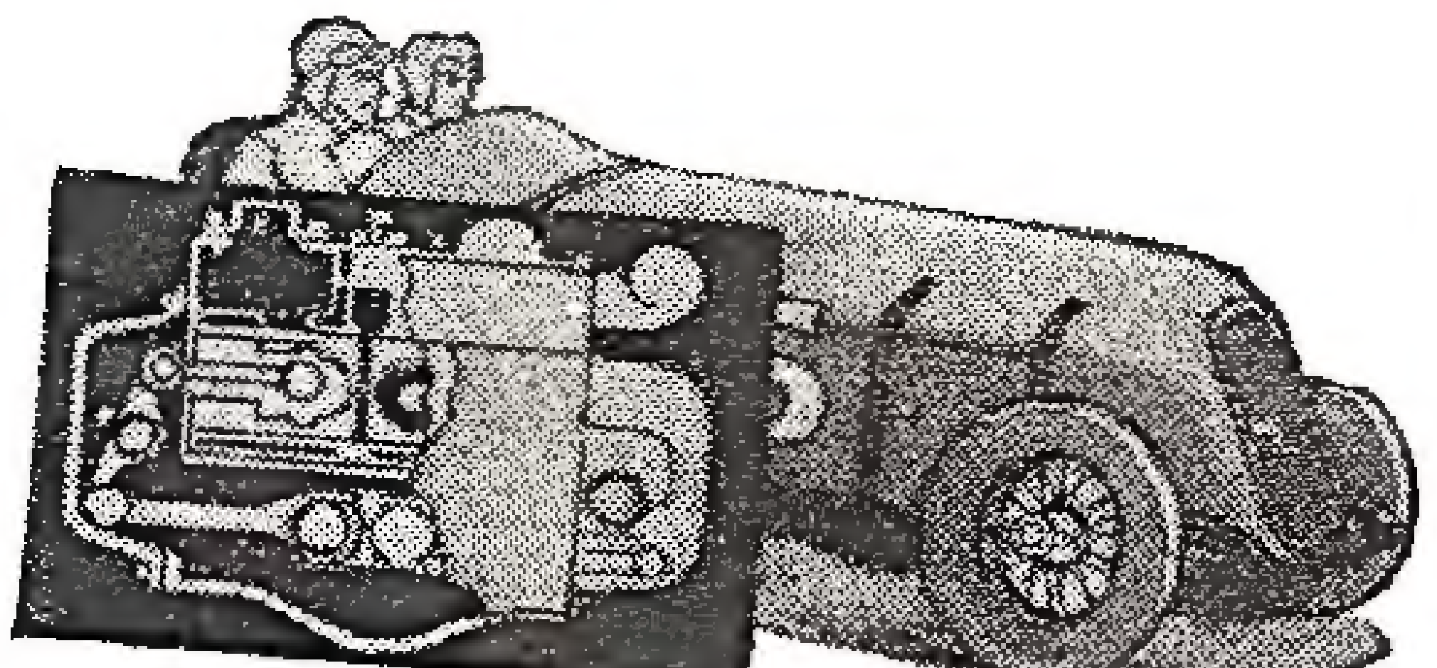
OF 1936



A startling inventive development brought to light this year is the famous Rust Cotton Picker said to do the work of seventy-five to one hundred men at one-sixth the cost. Will this prove as revolutionary in the cotton industry as Eli Whitney's famous cotton gin? Some say it will.



Aviation is, of course, a fertile field for inventive ingenuity. Important steps have been made to bring about the plane which average Mr. American man and woman can fly. Shown is an improved type of autogyro designed to land in any convenient spot. Then wings fold back and the plane serves as an automobile. Just one of many unusual aeronautical developments during the past year.



Diesel motors have commanded wide-spread attention. Shown is a racing car powered by Diesel. The car did 137.195 miles per hour. Inset shows a new Hill Diesel engine exhibited last year at New York Motor Boat Show. Its designer was R. E. Olds, pioneer in automobile industry.

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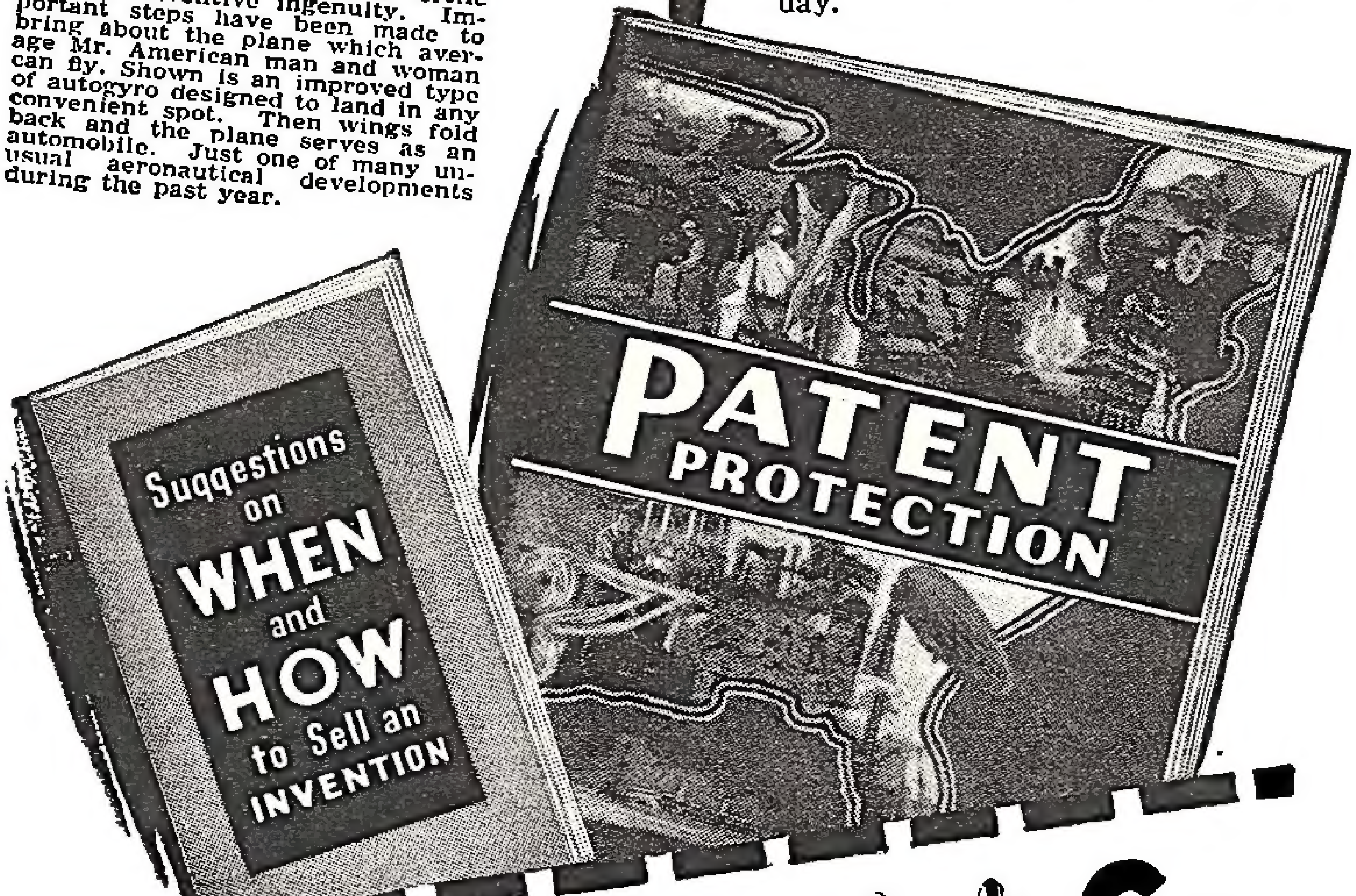

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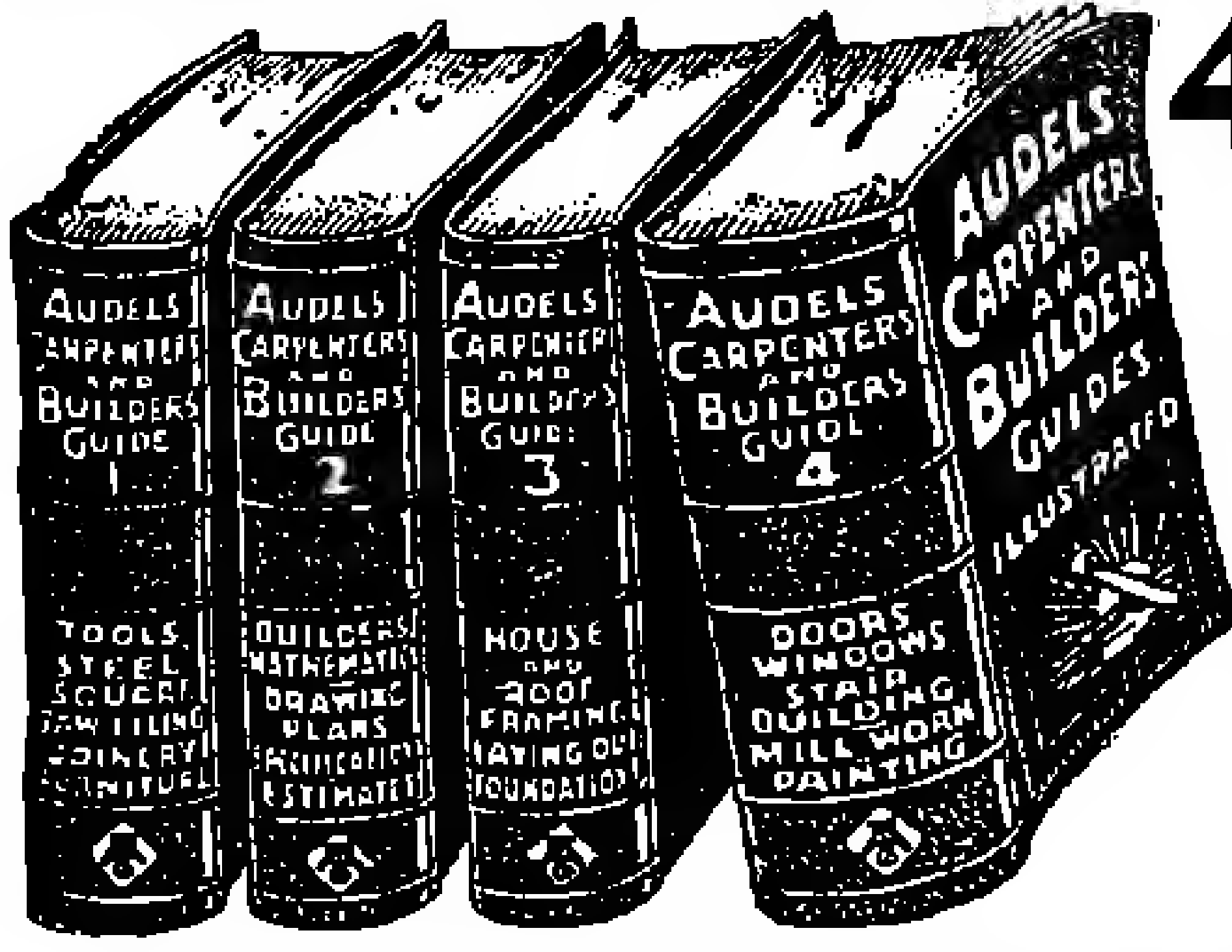

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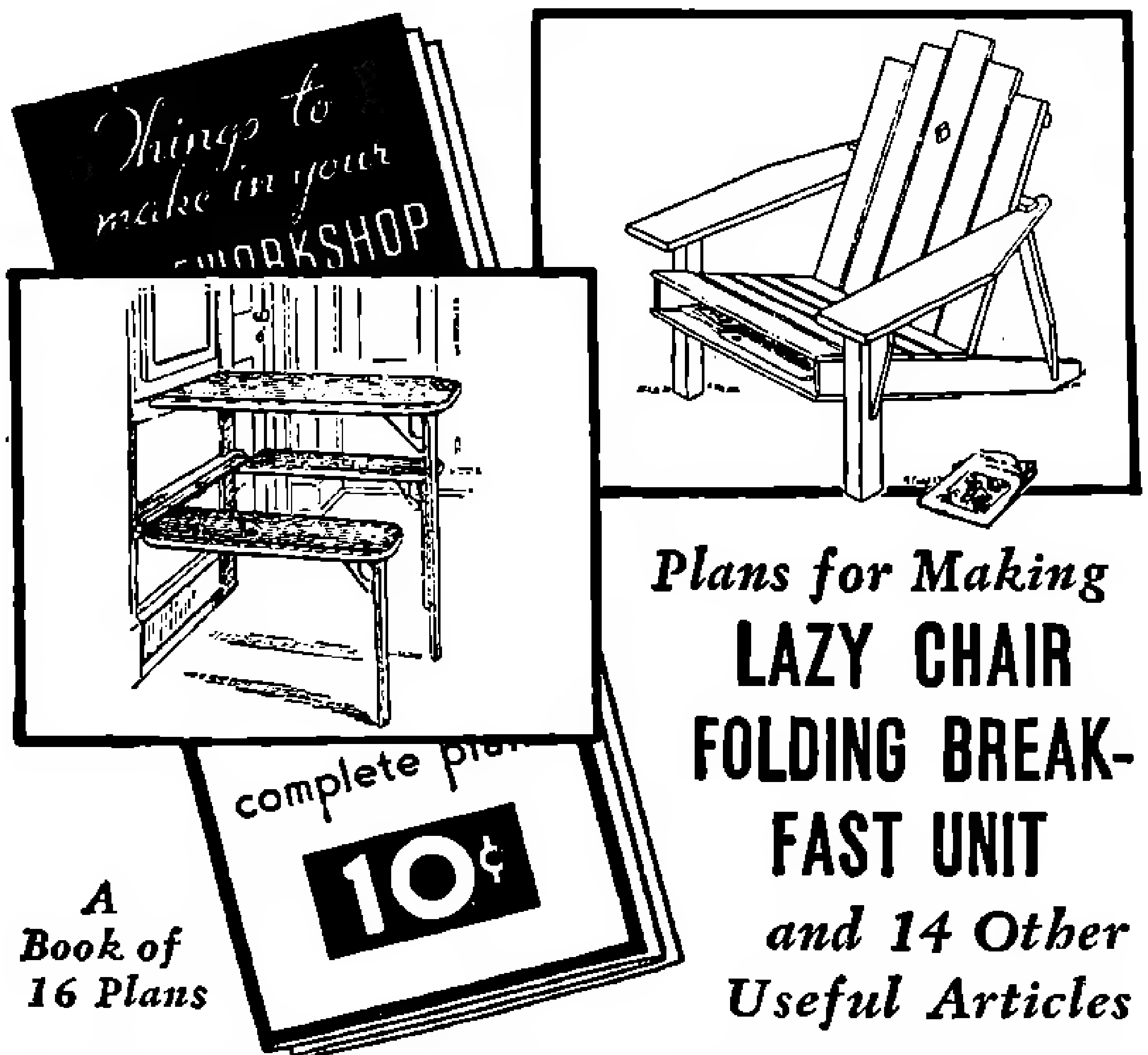

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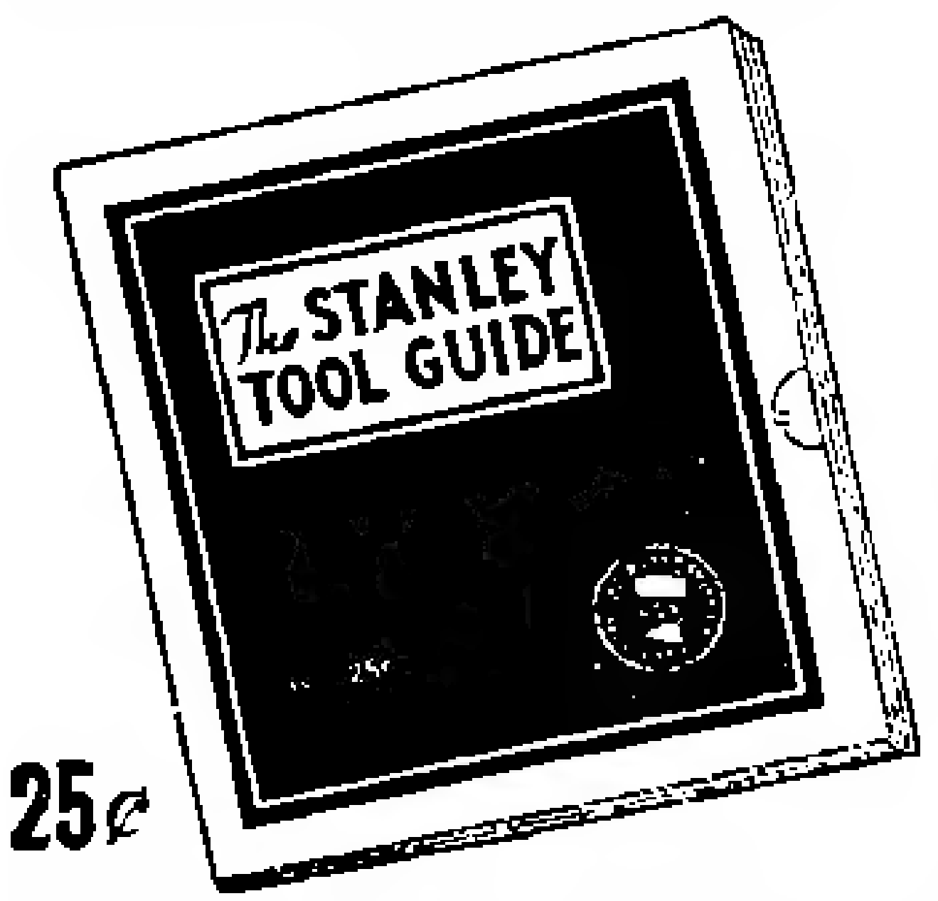

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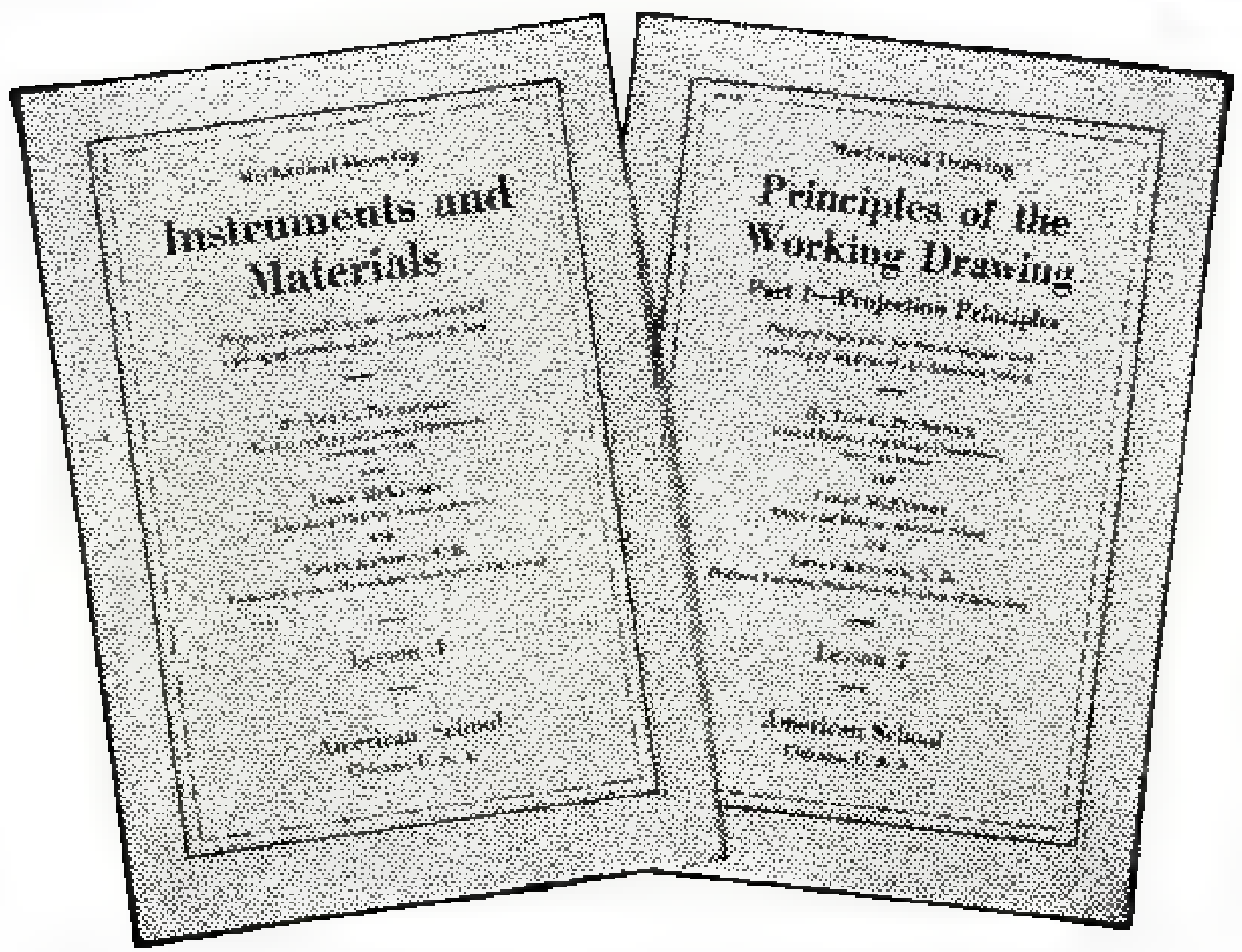

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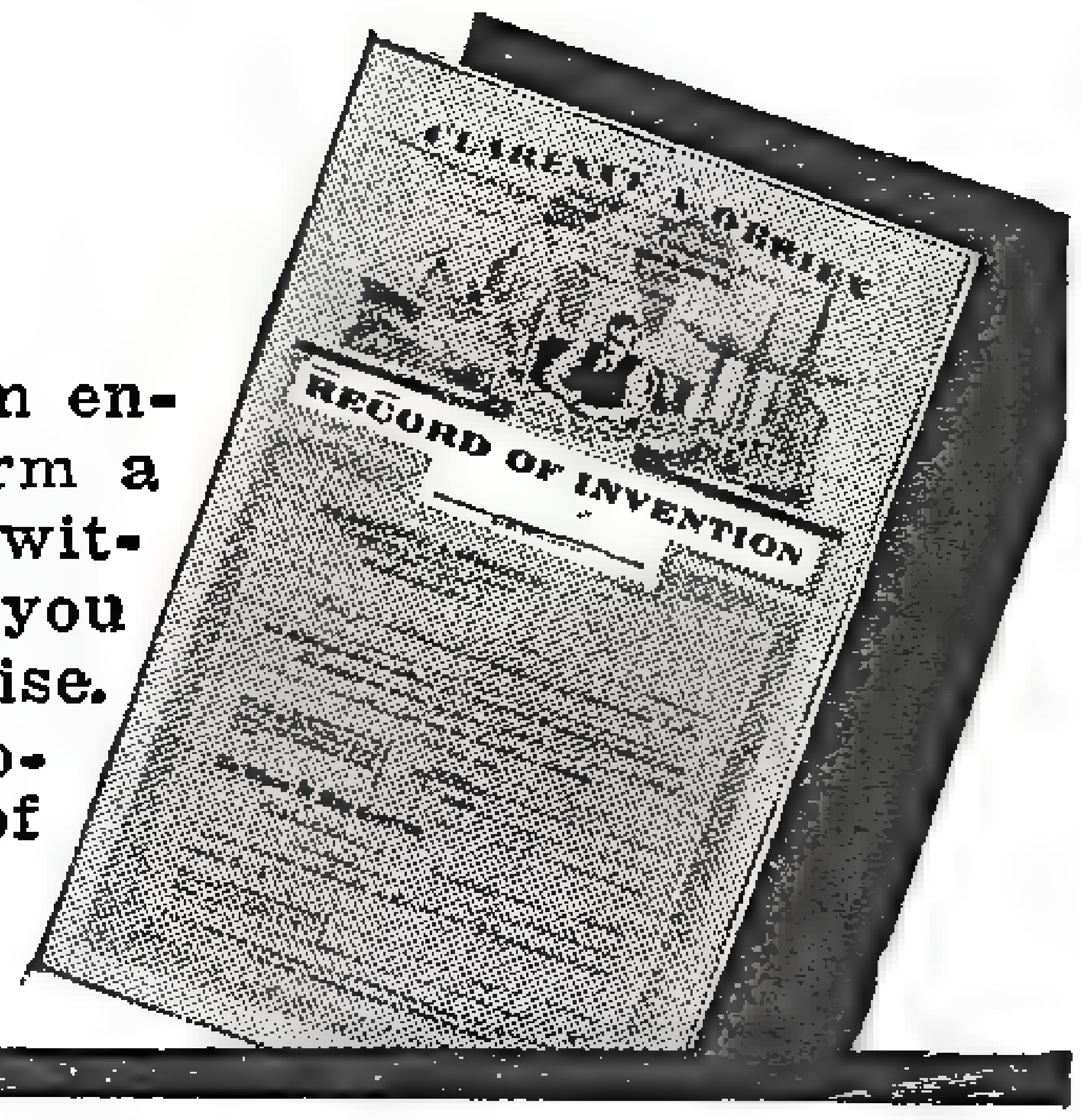

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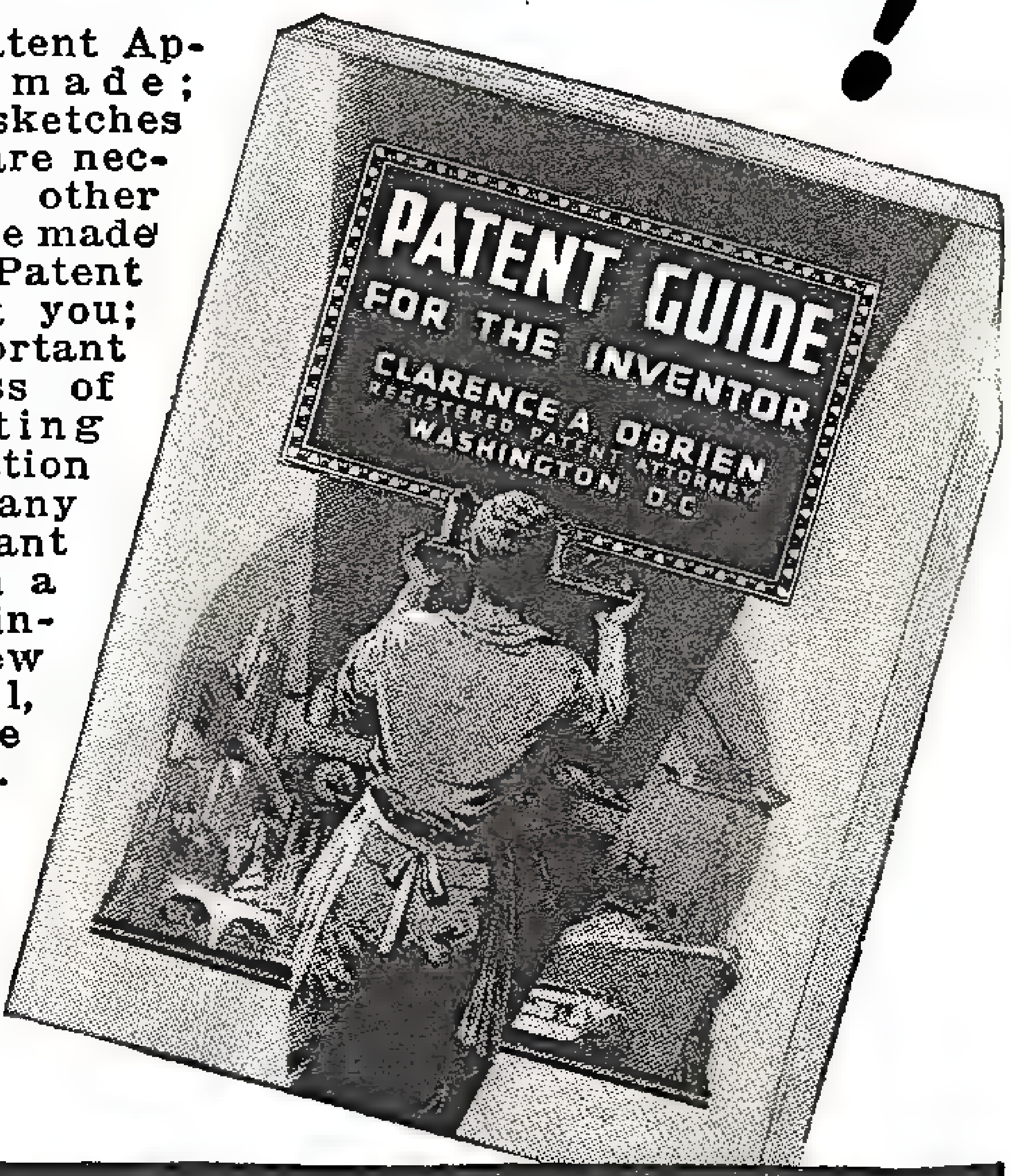

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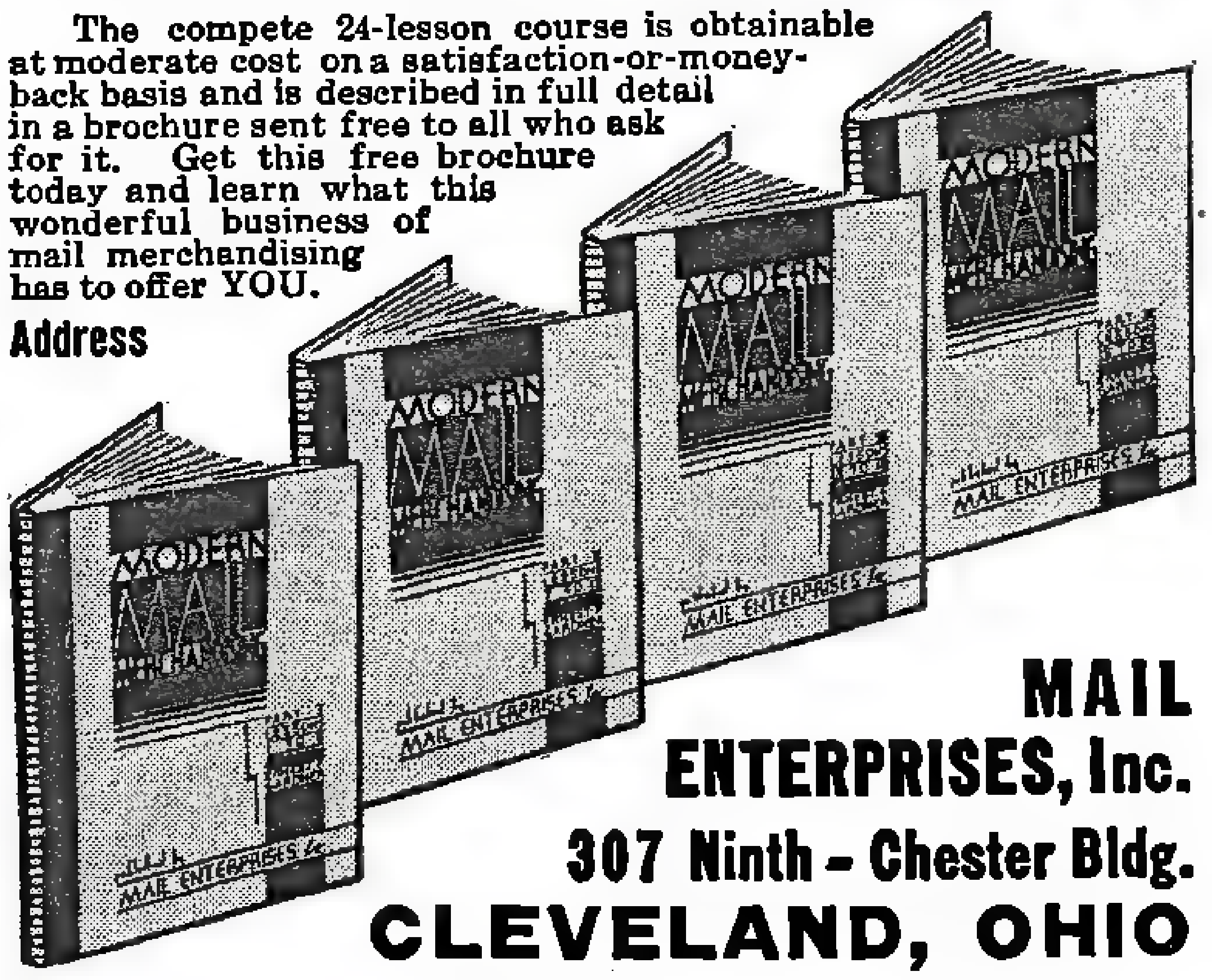

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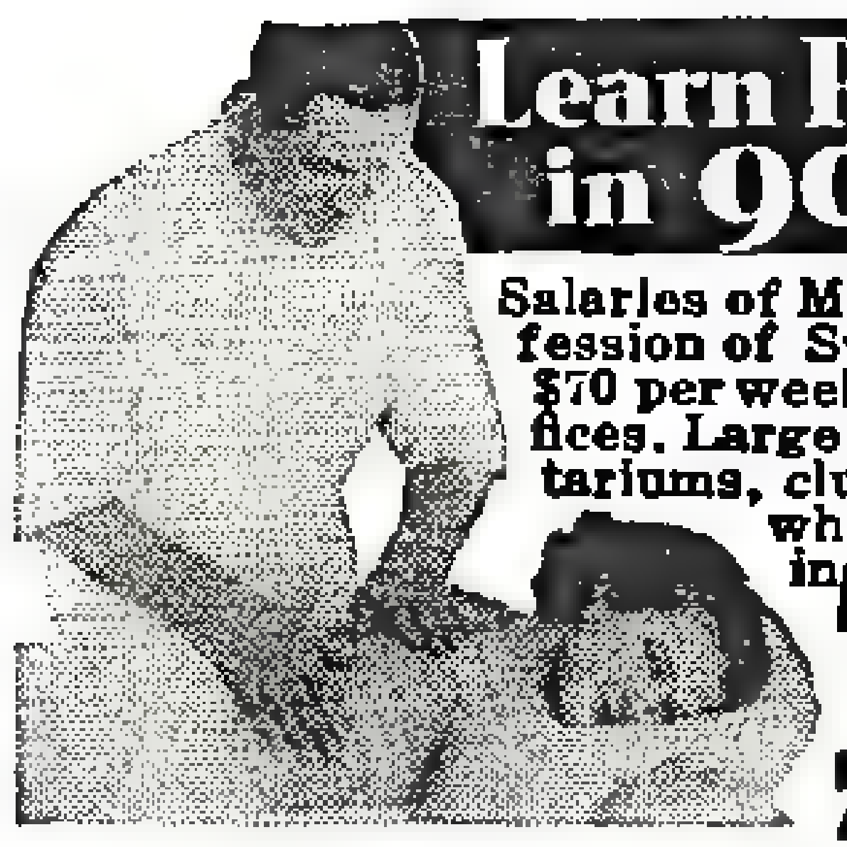

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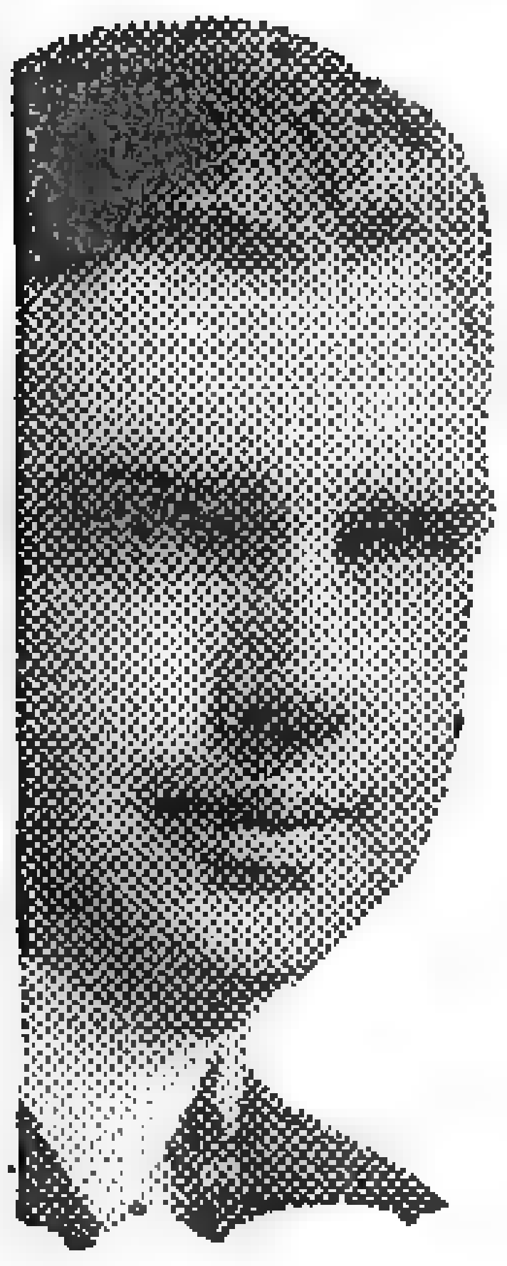

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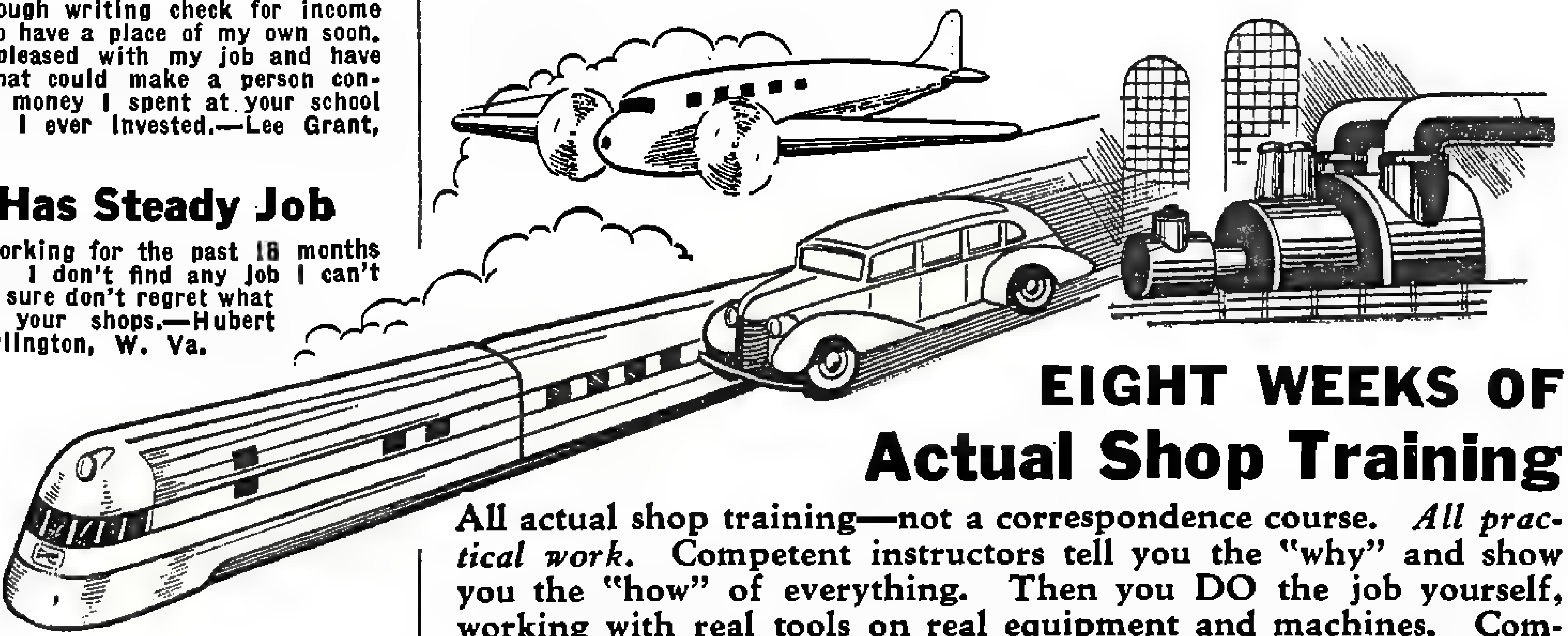

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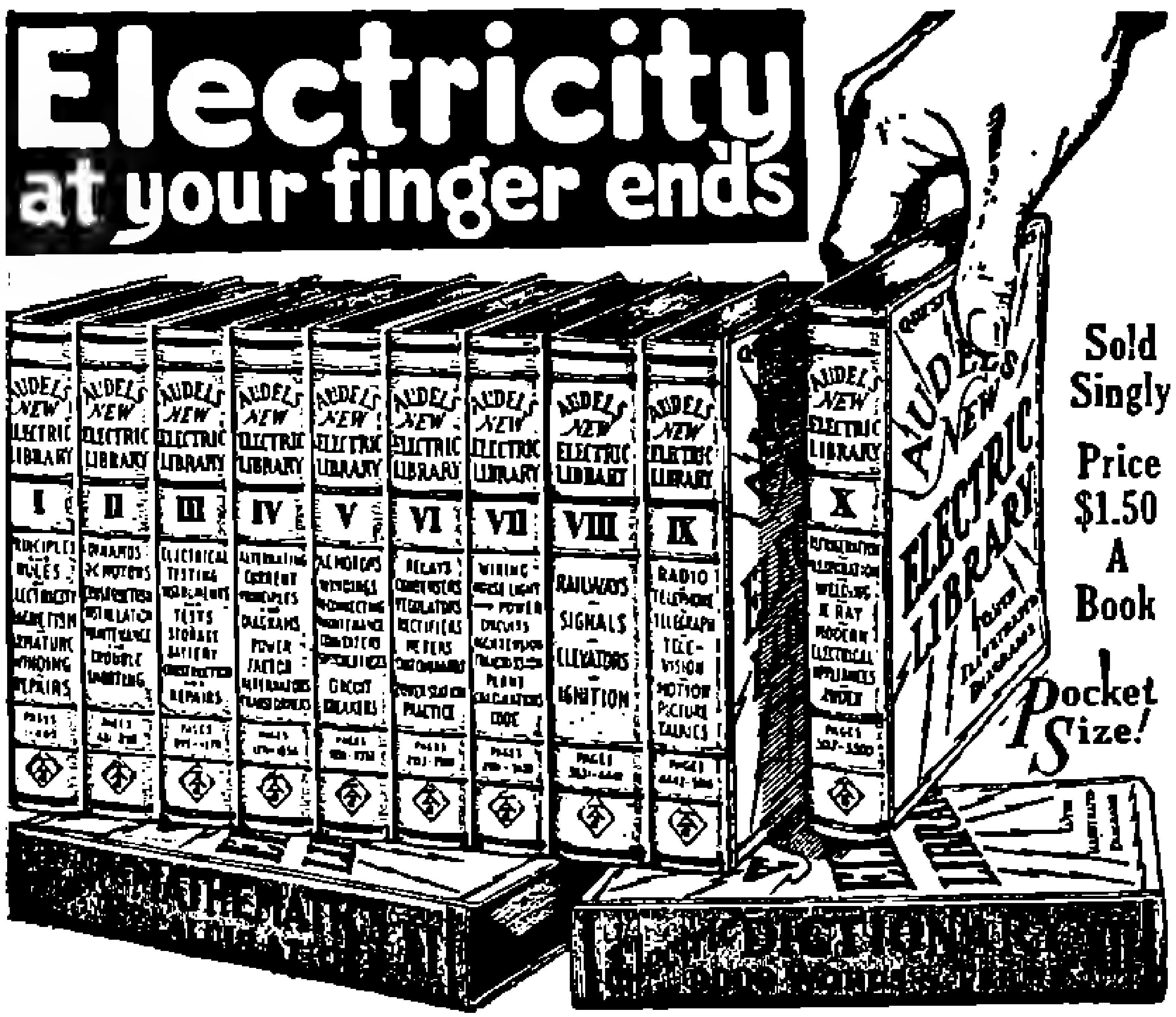

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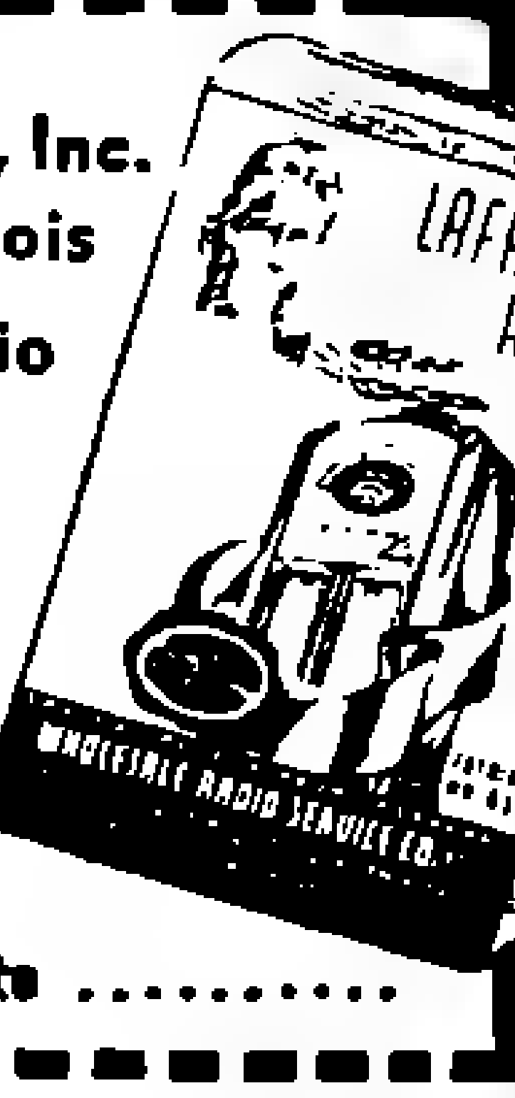

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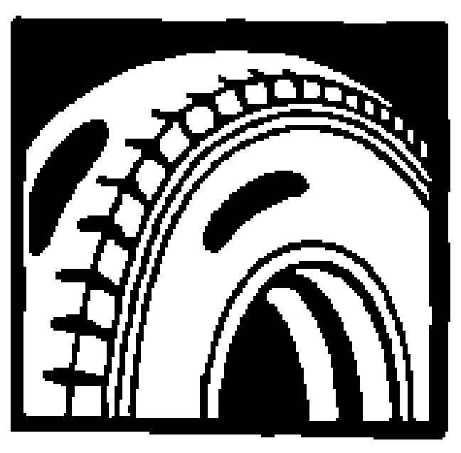

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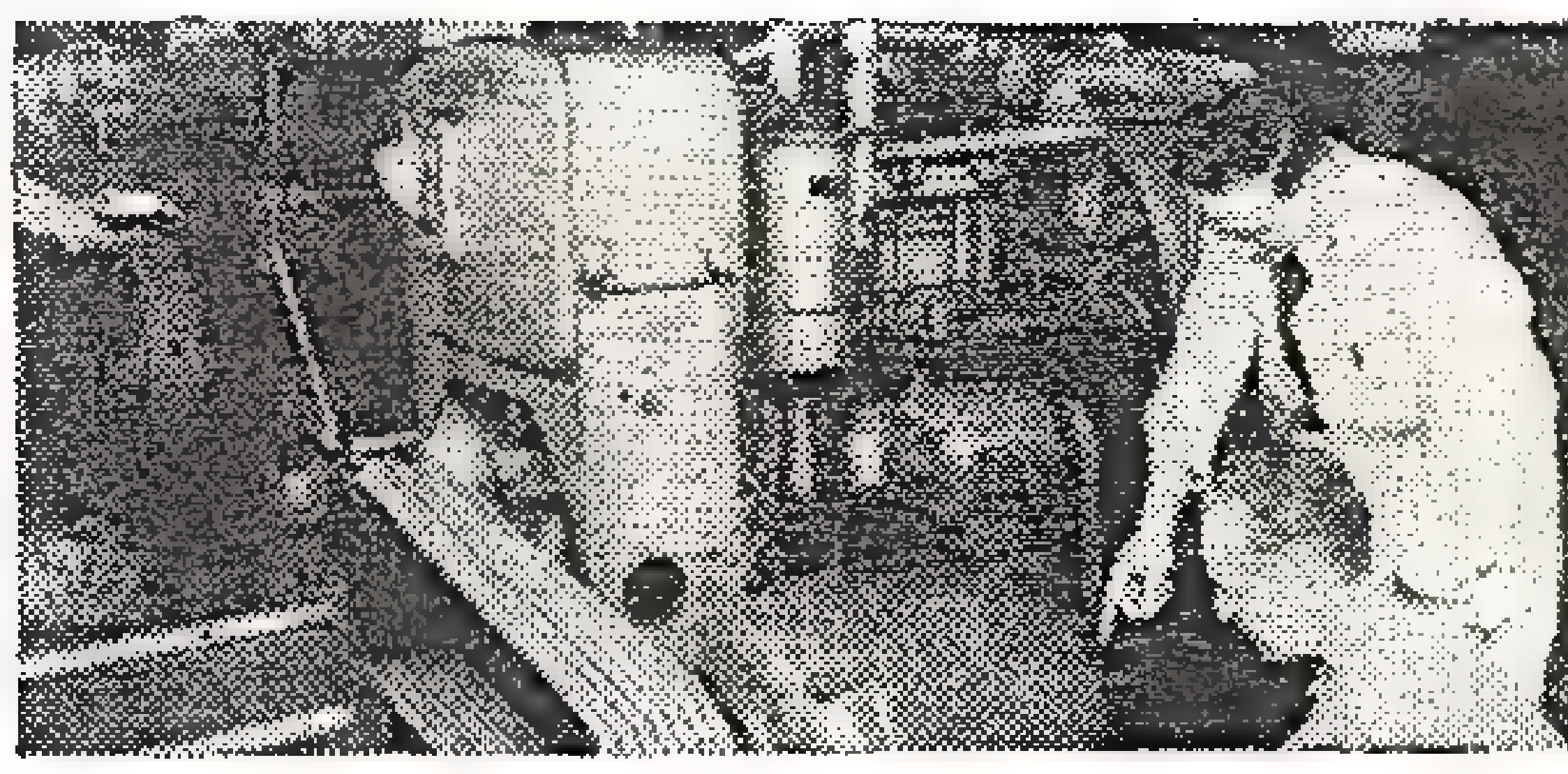
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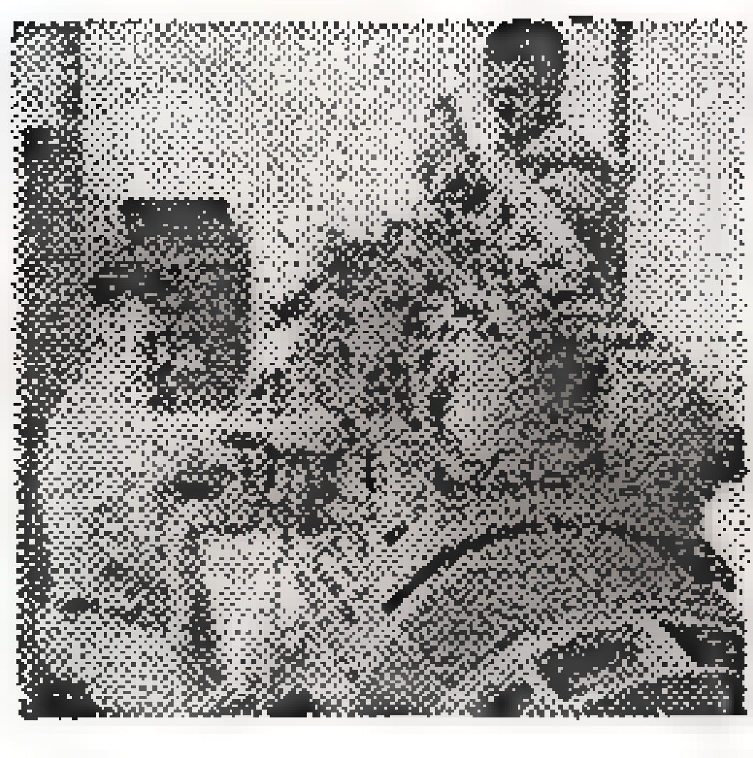
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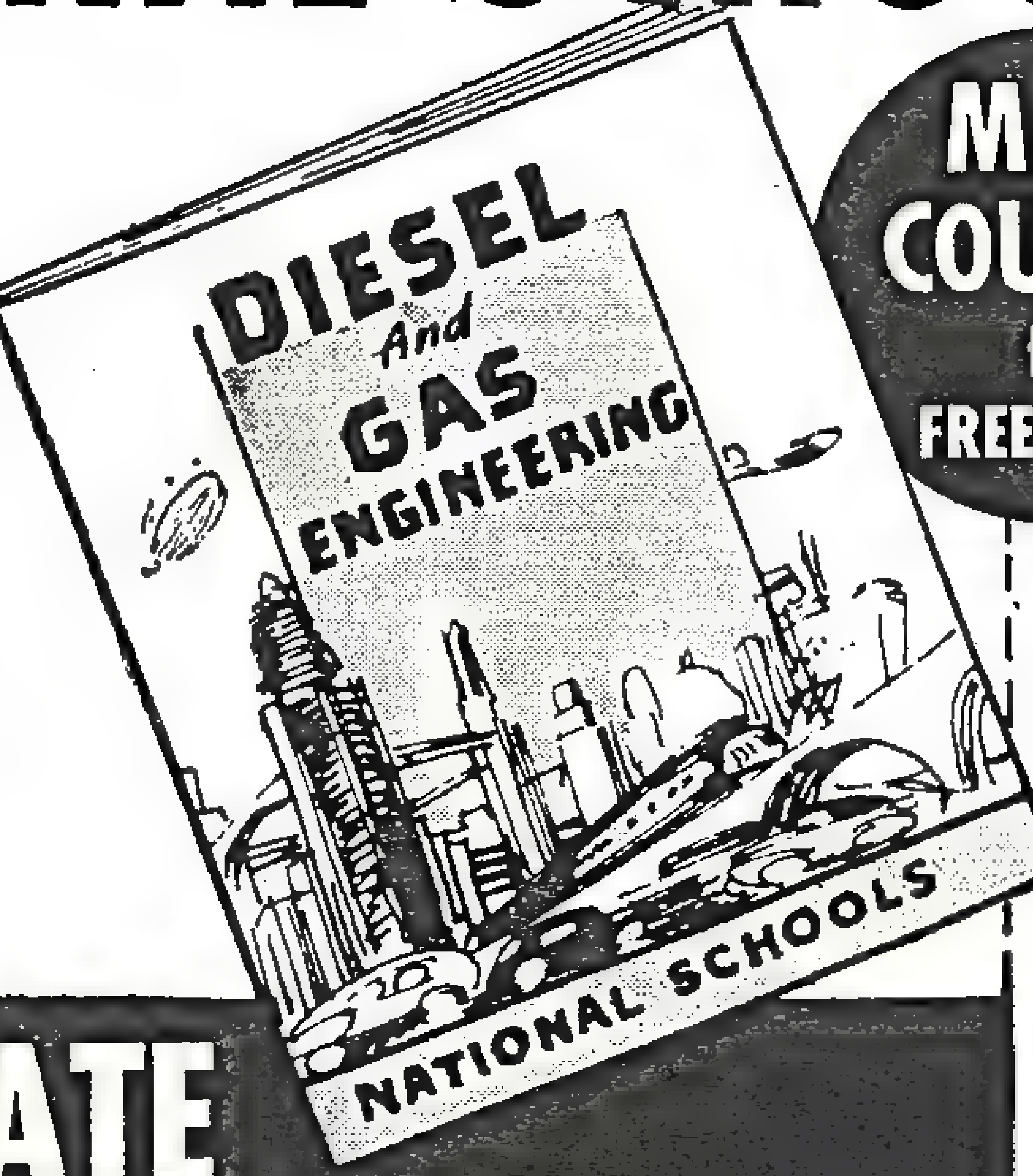

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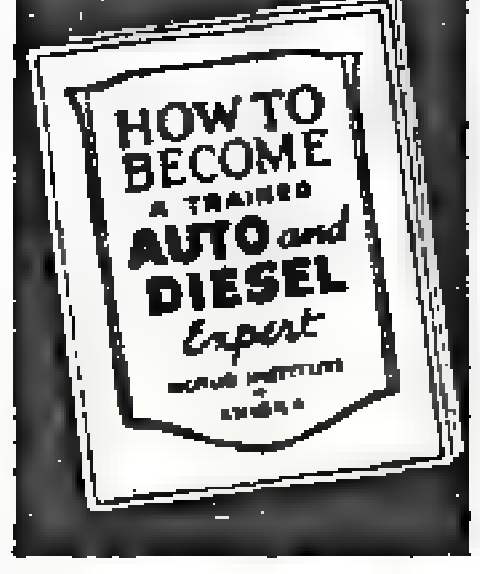
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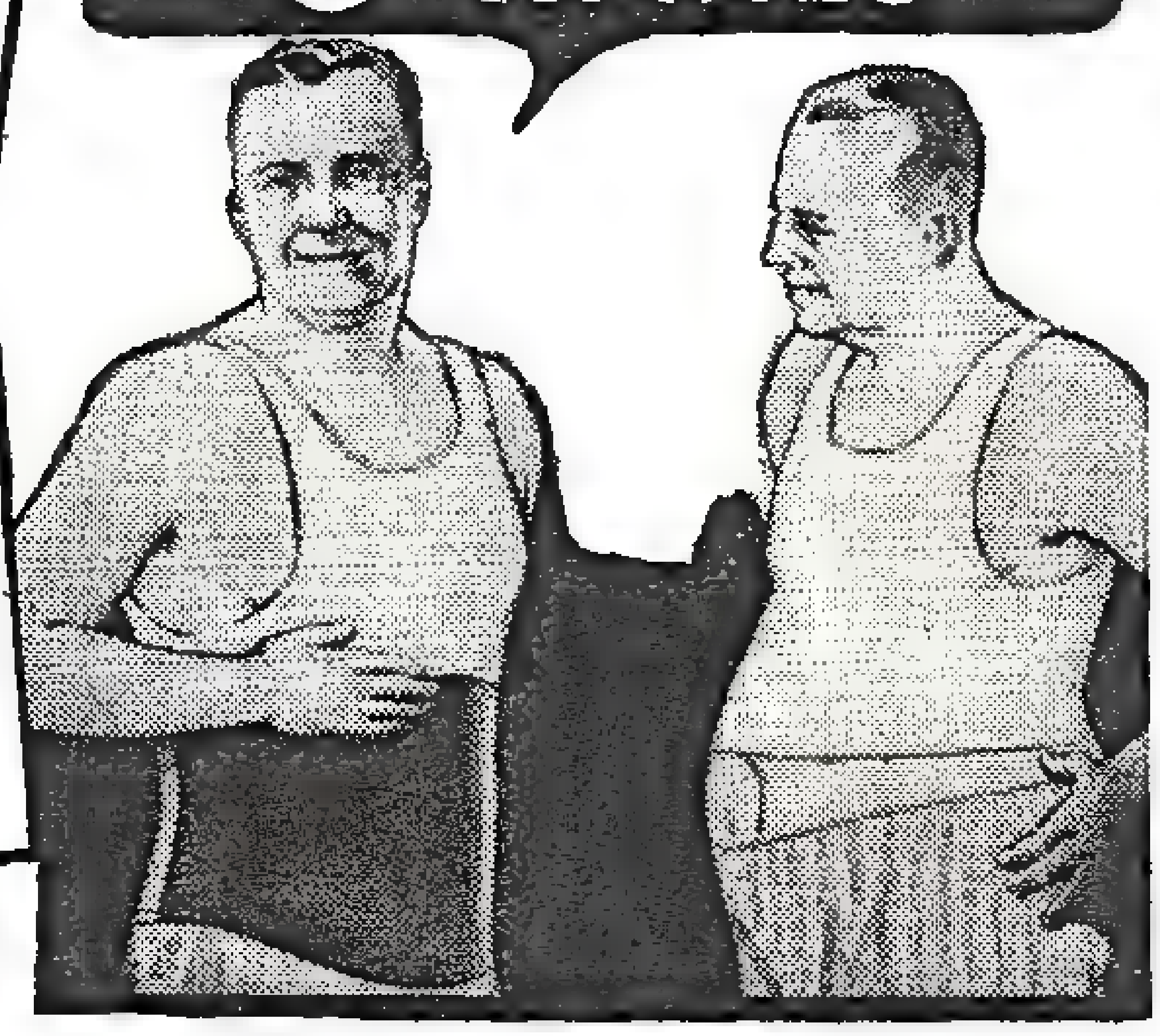

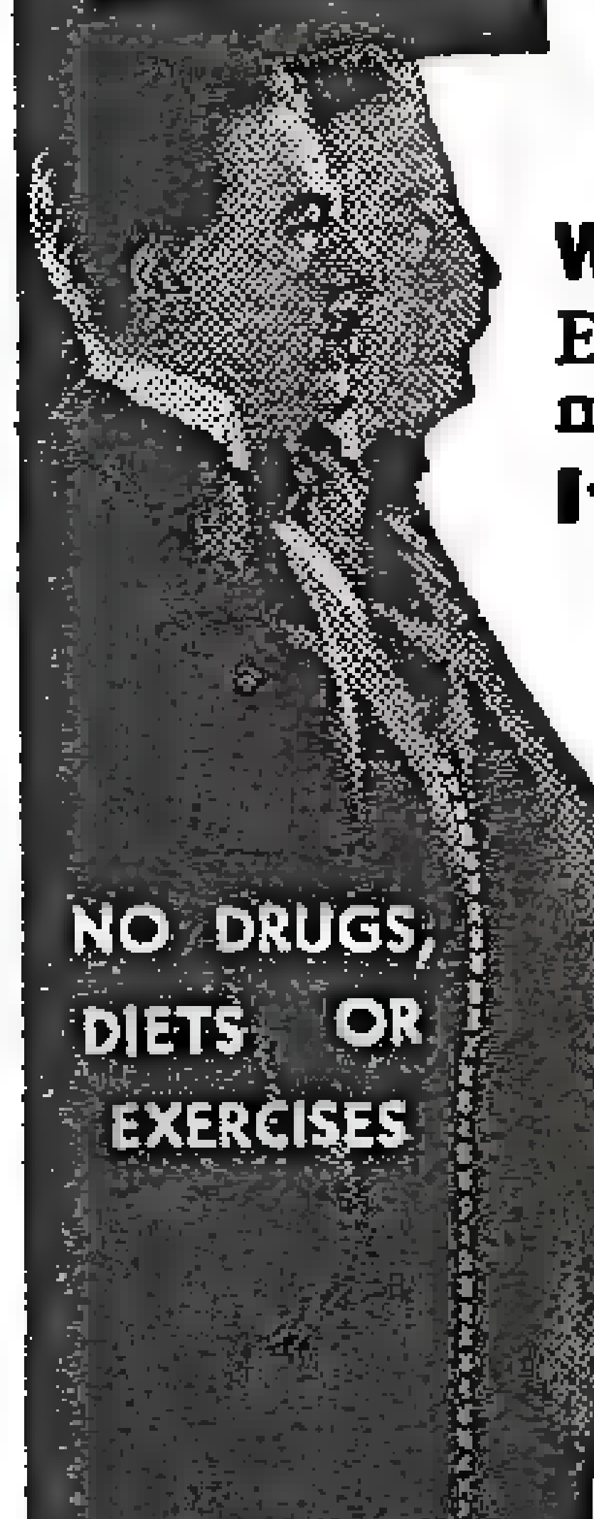
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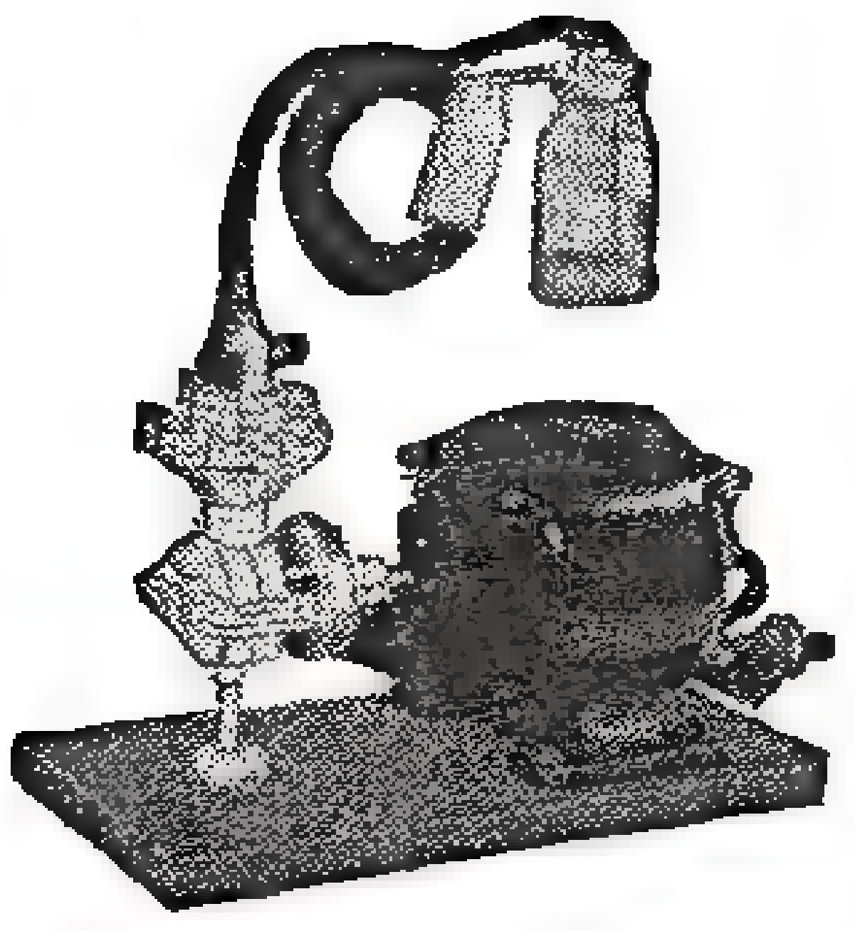

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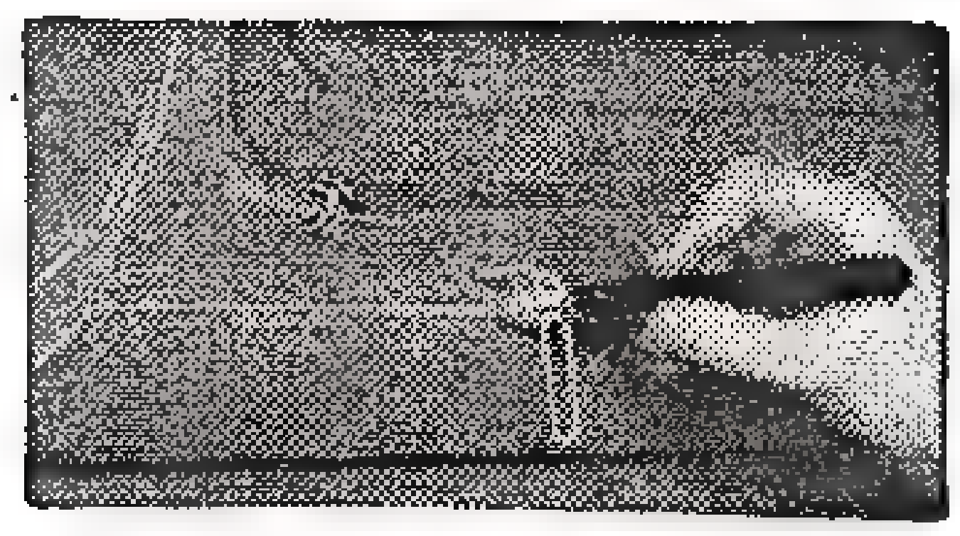

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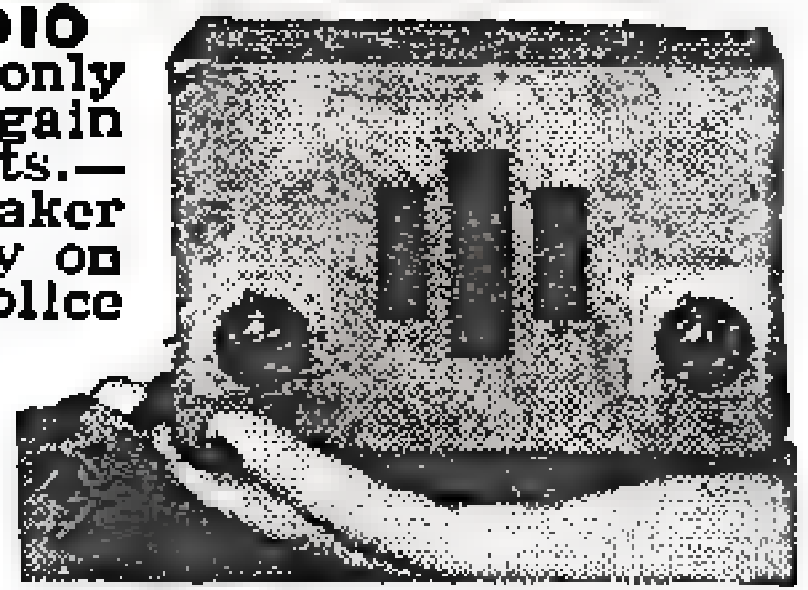

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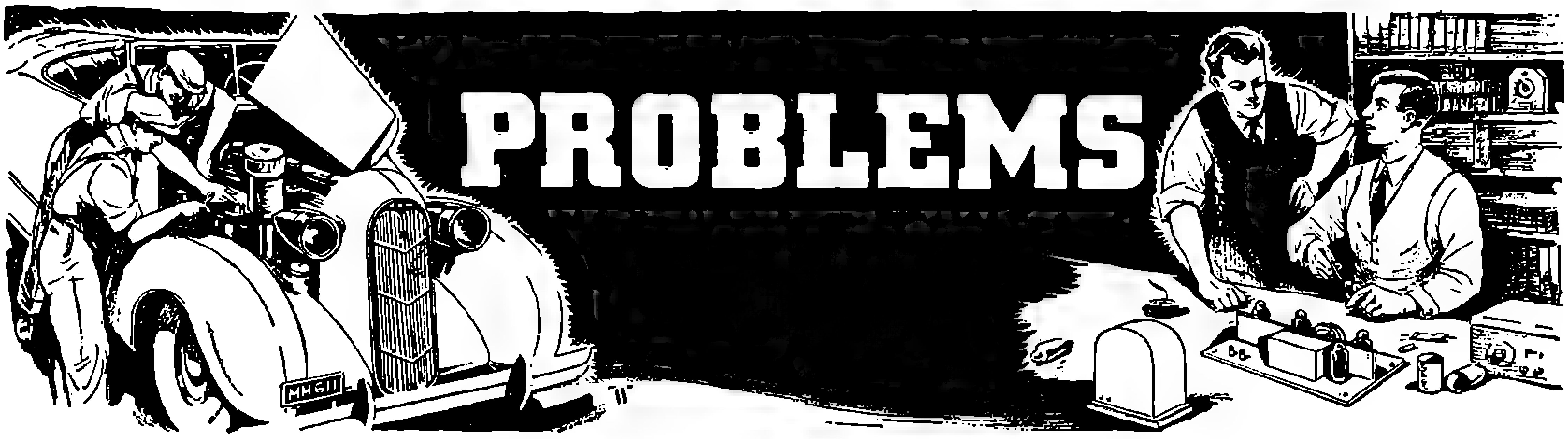

PROBLEMS

EDITORS ANSWER READERS QUERIES

MOTORCYCLE ENGINE FOR A BOAT

I would like to know if it is possible to use a 200-pound motorcycle engine in a 14-foot flat bottom boat of all-metal construction?—Floyd E. Fecke, Bonfield, Illinois.

We never advise the use of a heavy inboard motor to power a flat bottom rowboat unless the boat's displacement is sufficient to stand the added weight. Your 14-foot craft may be large enough to use an engine of the type you mention, but then there is the problem of cooling it. Since the craft would travel at a comparatively slow speed the motor would soon overheat. Copper coils wound around the cylinder vanes and connected to a water pump might solve the problem, but the method is too uncertain for us to suggest its use.

REFINISHING A WALNUT TABLE

We have an old walnut table which we wish to refinish. At the present time it is painted with an ancient black enamel which is badly worn. Can you suggest a way in which we can remove the old paint and apply a natural finish to the table?—E. M. Doane, South Bend, Indiana.

The first thing necessary in the refinishing process is, of course, the removal of the old paint. Any good paint remover can be used for this simply by following the instructions on the package. If paint remover is not available household lye can be used equally well by referring to the directions on the container. After all paint has been removed the table should be examined for worm holes, chips and other damage marks. Fill up cracks and chipped places with synthetic wood filler and allow time for it to dry thoroughly.

Next, sand down the surface of the table until it is perfectly smooth and apply a coat of dark walnut stain to bring out the grain in the wood. If one coat is not sufficient apply a second. When dry sand smooth with fine sandpaper and follow with a coat of clear shellac or varnish. Rub down the shellac with rotten stone and light lubricating oil until the surface is glass-smooth. Apply a final coat of shellac or varnish, spreading it on carefully, and the table refinishing is completed.

USING DYNAMIC SPEAKER IN SET

I have an electric radio receiver which is about seven years old, yet still works quite well except for the speaker which is an old magnetic type. What I wish to know is whether or not I can replace this speaker with a modern dynamic type so as to secure improved tone quality.—John Pritchard, Toronto, Ontario.

If you wish to replace the present speaker with a dynamic type we would advise the use of the new permanent dynamic speaker due to the simplicity of its installation. To connect the permanent dynamic speaker simply remove the old speaker connections from the set and connect the new. Since no field current from the power supply is needed for the new speaker it is suggested in preference to the usual dynamic speaker which requires at least 90 volts of B current to excite its field.

FLYING HOME-BUILT AIRCRAFT WITHOUT LICENSE

In what states can an airplane be flown without a license? I have heard that in Oregon and West Virginia anyone can fly any kind of plane, even a home-built type. Is this an actual fact or just a rumor? I thought that all planes had to be licensed by the Government and inspected by them, too.—K. C. Tate, Portland, Me.

Unless the States of West Virginia and Oregon have changed their laws regarding the flying of heavier-than-air craft it is still permissible to fly any kind of plane in those states without having the plane licensed. In all other states planes must be inspected by Department of Commerce or State Aeronautical Inspectors before they are allowed to take to the air. For full details regarding the regulations concerning the flying of planes write to the Bureau of Air Commerce, Washington, D. C., for the free bulletin, "License Requirements for Pilots and Aircraft."

ATTACHING A TRAILER TO AUTO'S BUMPER

Can you advise whether or not it is against the law to attach a trailer to the rear bumper of a car or must a special trailer coupling be used which attaches to the body of the car?—Lester P. Jackson, Dayton, Ohio.

In some states only light delivery trailers may be attached to the rear bumper of a car and then only when a substantial type of trailer hitch is used. In most states it is against the law to attach a cabin or house trailer to a car bumper. On large trailers the hitch must be connected to some part of the car's chassis. A pair of safety chains are also required on house trailers in addition to the approved hitch to prevent the trailer running away should the hitch accidentally break.

(Editor's Note: Your questions will be answered personally and free of charge by MM experts provided they do not require special research or involve trade secrets. Names and addresses of manufacturers of new products described in this issue can also be obtained free upon request. Enclose a self-addressed and stamped envelope for reply. Address: Problems Editor, Modern Mechanix Publishing Co., Greenwich, Conn.)

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If you are really serious about wanting to learn music—if you honestly want to become popular—to have the pleasure of entertaining your friends—take this first step *today*—send for this Free Booklet and Free Demonstration Lesson. Don't put it off. Mail the coupon below and they will be sent to you promptly. No obligation. Instruments supplied where needed, cash or credit. U. S. School of Music, 2622 Brunswick Building, New York City.

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Please send me your free book, "How You Can Master Music in Your Own Home," with inspiring message by Dr. Frank Crane, Free Demonstration Lesson and particulars of your easy payment plan. I am interested in the following course:

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NUFOND GIANTS WEIGH UP TO 3 LBS. EACH

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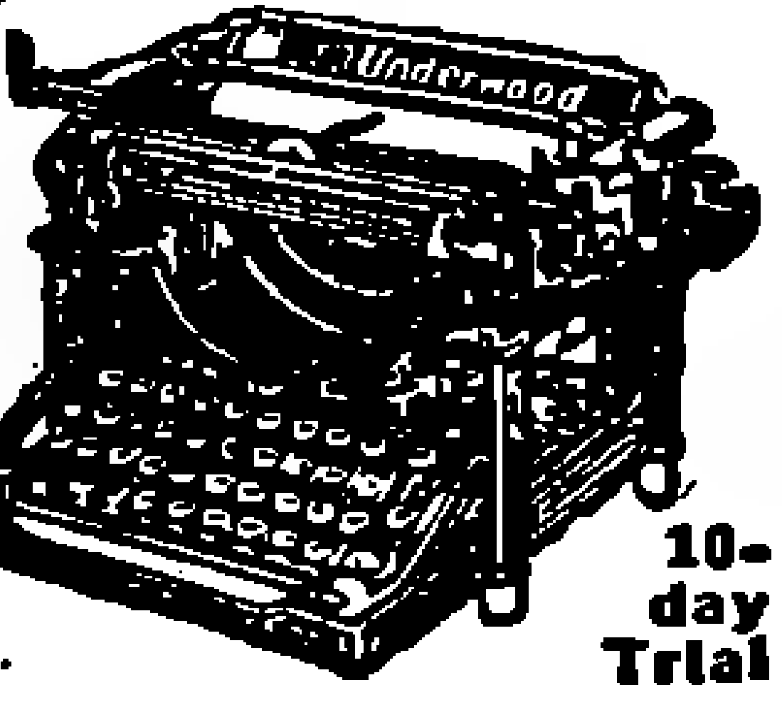

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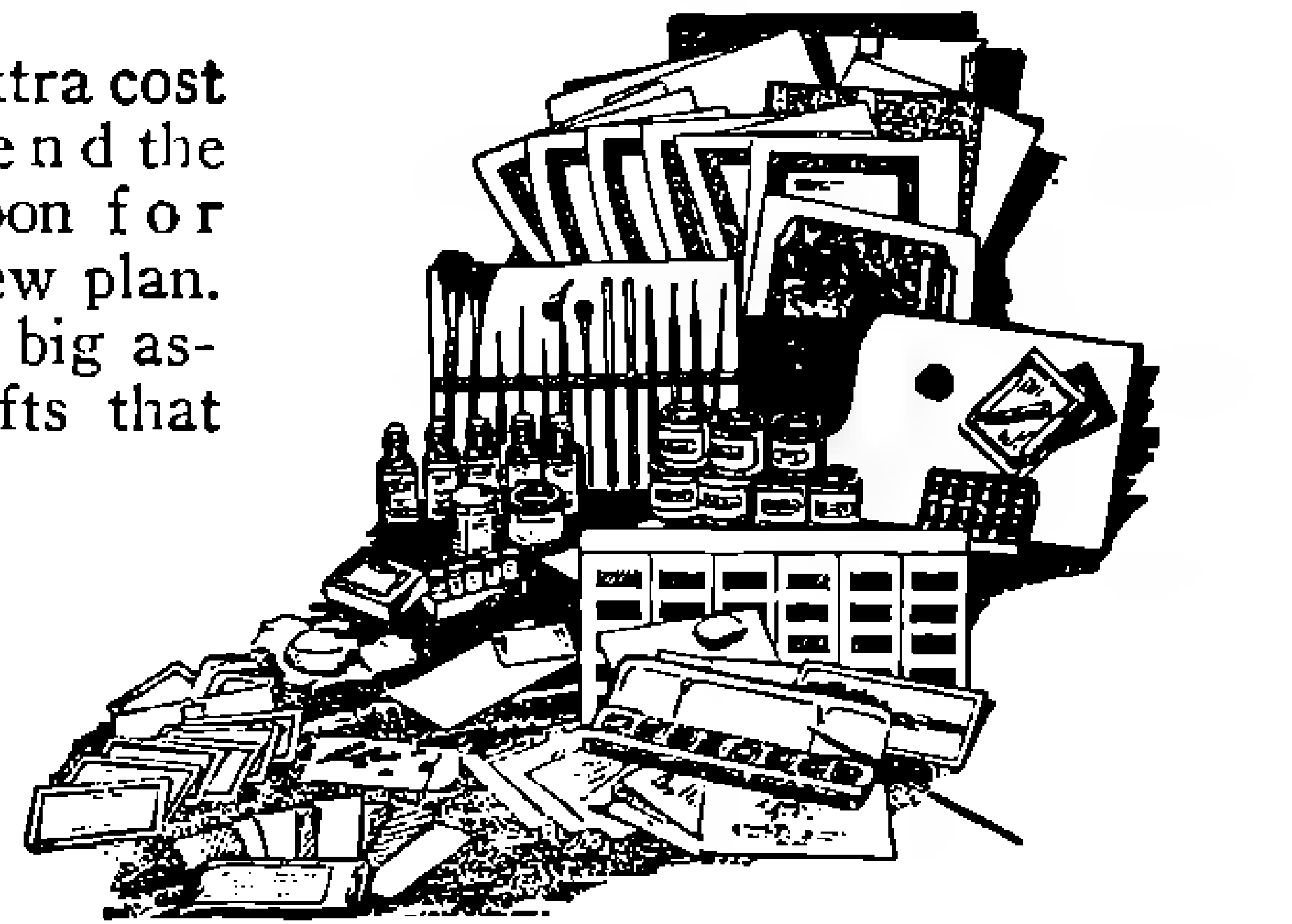

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ALL I want is a chance to give you PROOF—in just 7 days, and right in your own home—that I can give YOU the mighty muscles and boundless energy you want! Right in the first week under my guidance you will see and feel the improvement! Then as my weekly instructions arrive in your home you continue to rebuild, renew and "overhaul" your body. By the end of three months you have a powerful body that you will be proud to display.

People will notice the ruddy glow of health in your face, the sparkle in your clear eyes, your broad shoulders, and they will seek your company. You will be the fellow who walks off with the prettiest girl and best job while others wonder how you did it!

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Write your name and address carefully on the coupon below. I'll send you, absolutely free, a copy of my new book, *"Everlasting Health and Strength."* It reveals the secrets that changed me from a 97-pound flat-chested weakling into a husky fellow who twice won the title of "The World's Most Perfectly Developed Man" against all comers! And it shows how I can build you into an *"Atlas Champion"* the same way.

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I'll add pounds of muscles where they are needed! Are you fat in spots? I'll show you how to pare down to fighting trim.

And with the big muscles and powerful evenly-developed body that my *Dynamic-Tension* method so quickly gives you, I'll also give you through-and-through health—health that digs down into your system and banishes constipation, pimples, skin blotches and similar conditions that rob you of the good things of life.

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Get my free book, *"Everlasting Health and Strength!"* Mail my coupon today. Gamble a stamp to prove I can make YOU a new man!

NOTE: This is the latest photo of Charles Atlas showing how he looks today. This is not a studio picture but an actual untouched snap-shot.

NECK
17 IN.
FOREARM
14½ IN.
BICEPS
17 IN.
CHEST NATURAL
47 IN.
WAIST
32 IN.
THIGH
23¼ IN.
CALF
16 IN.
WEIGHT
178 LBS.
HEIGHT
5 FT. 10 IN.
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WIN THIS STERLING SILVER CUP

BEING GIVEN AWAY BY

Charles Atlas

Holder of Title "World's Most Perfectly Developed Man"

This valuable cup, made of solid sterling silver, stands about 14 inches high on a black mahogany base.

I will award it to my pupil who makes the most improvement on his development within the next three months.

Get my free book by mailing coupon below!

48-PAGE BOOK FREE

It tells you all about my *Dynamic-Tension* method, and how it has made big muscled men out of run-down specimens. It shows you, from actual photos, how I have developed my pupils to the same perfectly balanced proportions of my own physique. What my system did for me and hundreds of others it can do for you too. Don't keep on being only half the man you CAN be! Find out what I can do for you.

Where shall I send your copy of "Everlasting Health and Strength?" Put your name and address on the coupon, or a postcard. Mail it today. CHARLES ATLAS, Dept. 6P, 115 East 23rd Street, New York, N. Y.

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Name ....
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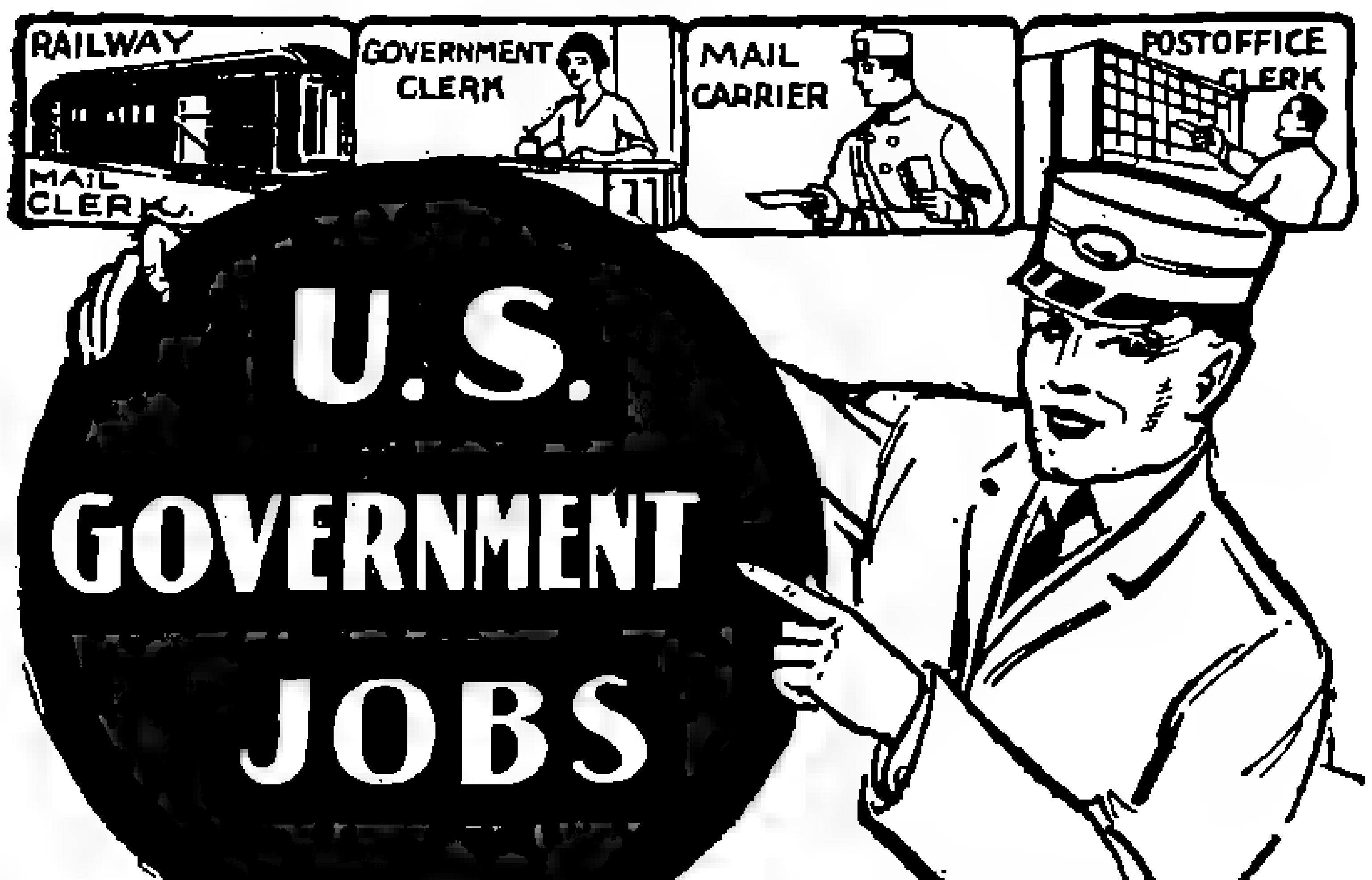

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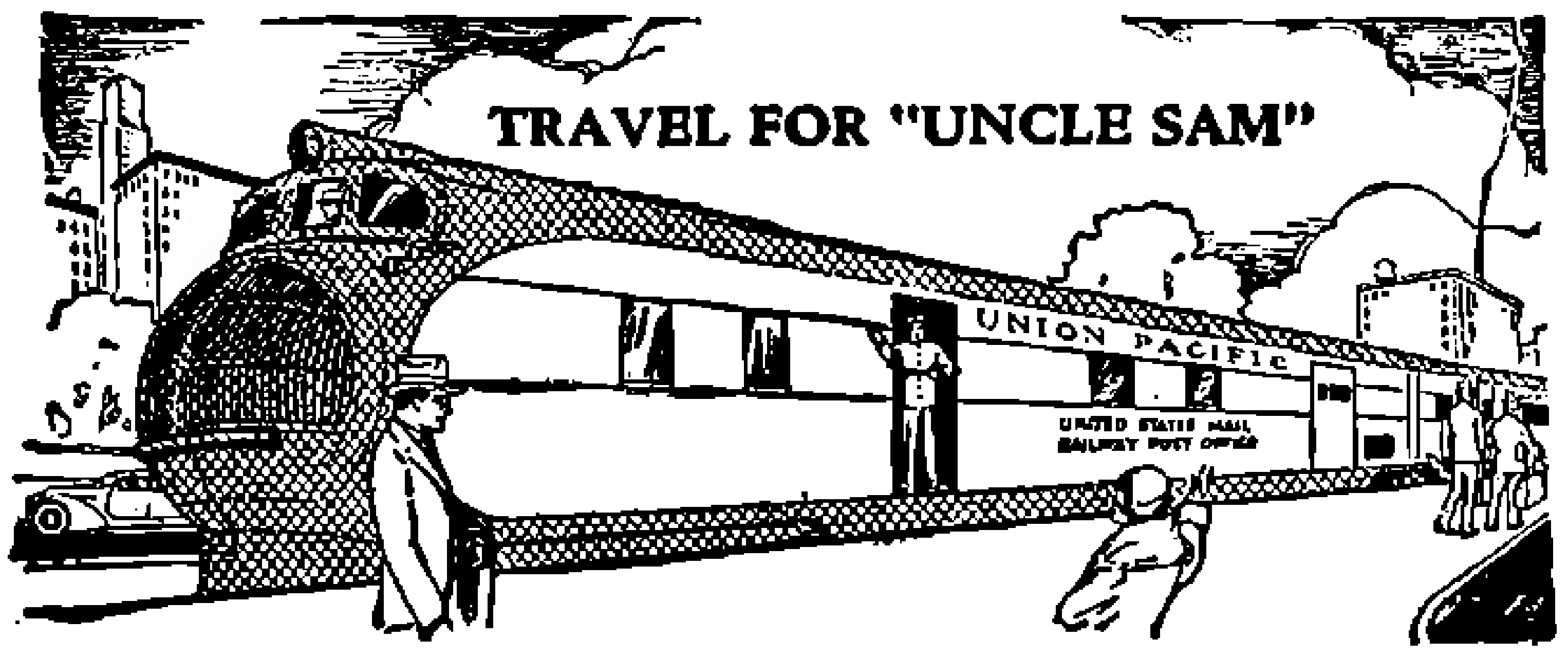

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Gentlemen: Rush to me, FREE of charge, list of U. S. Government big pay jobs. Send me FREE 32-page book describing salaries, vacations, hours, work, and full particulars on how to get one of these jobs.

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Beautiful Clear Loud Tone Direct From Pocket Radio.

Fits pocket easily. All one unit—just like the big sets, but this LIGHTWEIGHT Radio measures only 5 in. x 3½ in. Take it with you—listen to music, sports, radio entertainment.

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BOYS BIG FUN. You apparently see thru Clothes, Wood, Stone, any object. See Bones in Flesh. FREE PKG. radio picture films, takes pictures without camera. "You'll like 'em." 1 pkg. with each 25c order.

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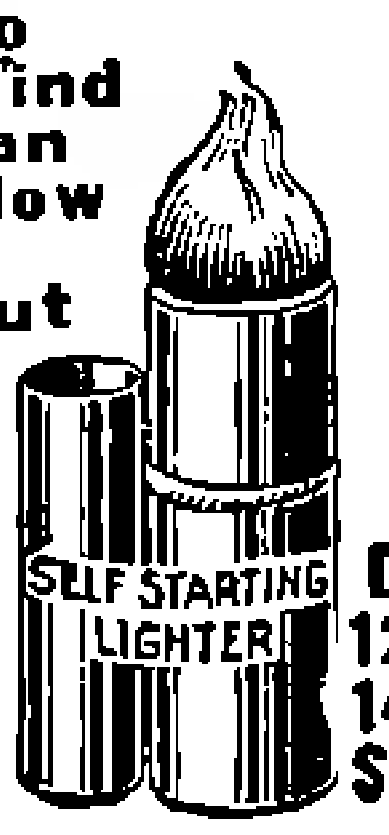
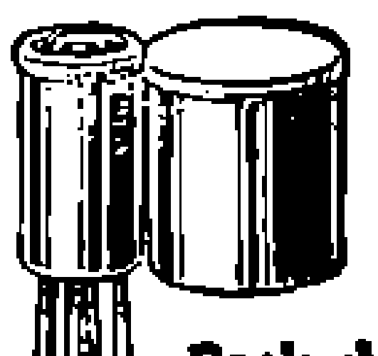
Self Starting Lighter

No Wind Can Blow It Out





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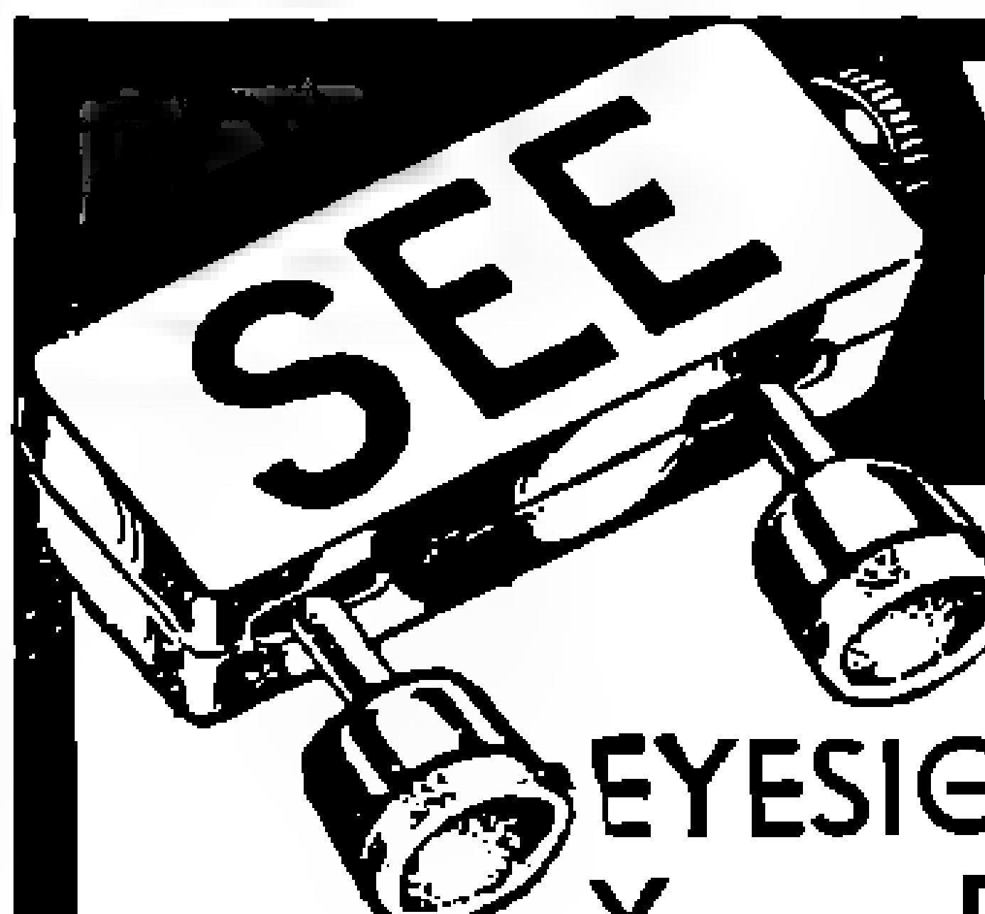

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If you wear glasses, or think you should, our FOUR MONTHS' TRIAL OFFER—containing the inspiring story of glasses discarded for Nearsight, Farsight, Astigmatism, Old Age Sight, Eyestrain, Weak Eyes, Eye Muscle Trouble, Etc., as told by USERS AT HOME of this Revolutionary System—will be mailed FREE upon request.

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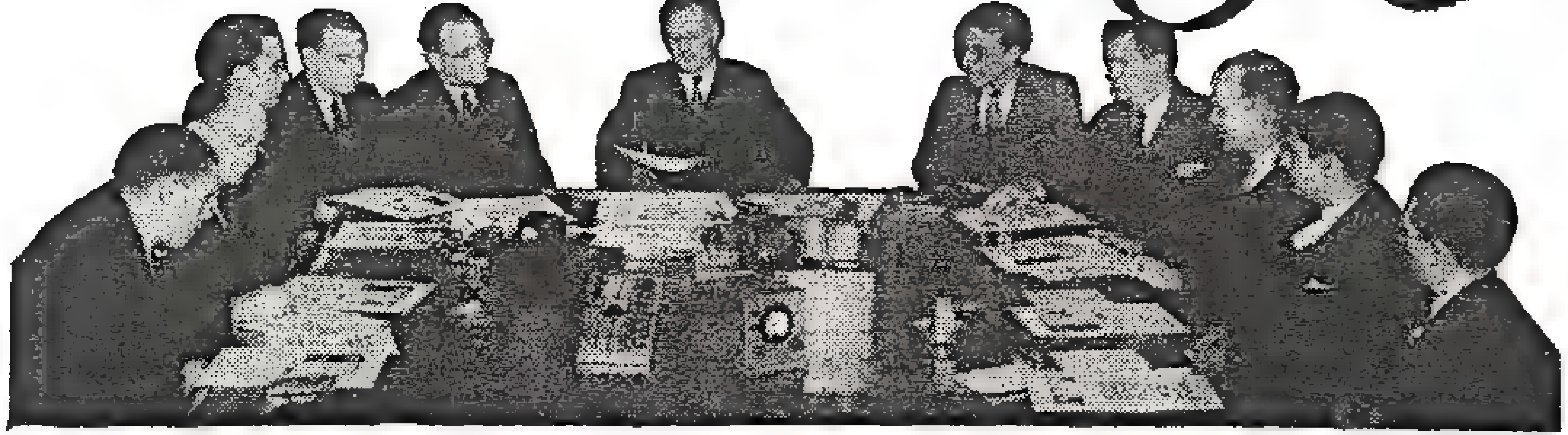
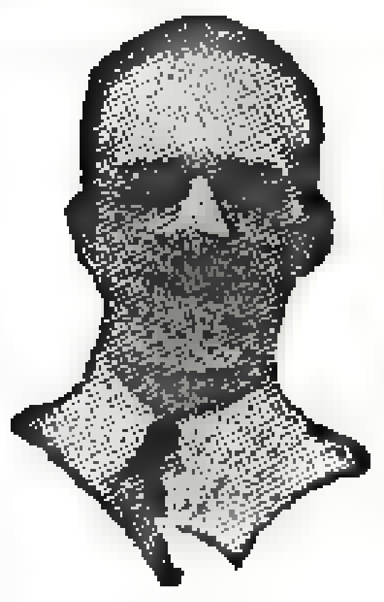
R-T-I Advisory Board of leading Radio Engineers in regular conference with members of staff.



Mail Coupon for my FREE BOOK that shows how Factory Engineers will Prepare You at home for Good Pay Spare Time or Full Time Radio Jobs



Big Money in Police Radio

Student W. H. Carr, 402 N. 16th St., Kansas City, Kansas, has charge of 35 radio equipped police and fire department cars. Earns $230.00 a month, plus free automobile, oil, gas, etc. Gives R-T-I credit for his success.

Makes $600 in One Month

Herbert B. Thomson, Gorman, Texas, former oil well driller, borrowed $170 to start own radio shop now worth $3,500. Made as high as $450 in one month. Says, "It pays to be R-T-I trained."

Starting Salary in Radio Most Money Ever Earned

Harold Apley, 2639 Brookside, Indianapolis, made $30 extra weekly in spare time radio work then went to work for big firm starting with bigger pay than he ever earned before. Says, "Glad to recommend R-T-I."

Learn to EARN up to $75 *Weekly* [MANY R-T-I STUDENTS GET MORE]

Trained Men Needed in All Branches

If you're dissatisfied with small pay—lay-offs and an uncertain future—here's an opportunity that's too good to miss. At the cost of only the time it takes you to mail the coupon, you can get my big FREE book, "RADIO'S FUTURE AND YOUR OPPORTUNITY." This book tells how you can **learn at home under the supervision of factory engineers, to make more money** almost at once in Radio—whether you want to make Radio your life's work, or use it to pick up an extra $5 to $20 a week in your spare time.

More Opportunities Than Ever Before

Radio is still forging ahead. **1936 beats all other years.** Over 6 million new sets sold. Over 30 million dollars paid for service alone this year. Where only a few hundred men were employed a short time ago, thousands are employed today. And where a hundred jobs paid up to $75 a week—there are thousands of such jobs today—many paying even more. And new jobs are being created all the time—**full time jobs and spare time jobs.** Get my book and see how easy it is to learn at home for this good-pay work.

"Shop Training" for the Home

R-T-I Training is different than any training you ever heard about. It comes to you right from the heart of the Radio Industry—right out of the factories where Radio sets and other vacuum-tube devices are made. It was planned and prepared and is supervised by big radio engineers IN these factories—by men appointed for the purpose. This means that trained the R-T-I way, you'll be trained as the Radio Industry wants you trained—just as the Radio Industry, itself, would train you if it was doing the job.

Television, Photo Electric Cells, Public Address Systems Included

Radio service work is only the starting point in R-T-I Training. From there it will take you through the whole field of Radio and Electronics. You will learn about every new development, including Television, so you'll be ready when Television breaks. You'll also learn the big money subjects such as Aviation and Auto Radio; Public Address Systems; how to handle Photo Cells; Sound Picture Recording, Etc.

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Age or Lack of Experience No Handicap

You don't have to be a high school graduate, nor even have finished the grades. My Training is so simple, easy, and practical, that the average man, regardless of age, education, or previous experience can master it. It offers the chance you have wanted to get out of a small-pay, no-future job, into good pay work with a future, in Radio and all its branches.

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INVESTIGATE! Learn why R-T-I Training is different. Find out why R-T-I Trained men get "Quick Results" and "Big Results." Send for your copy of "Radio's Future and Your Opportunity" today. It tells you about Radio's amazing opportunities. It describes my approved training. It tells what R. T. I. students are doing and making. It gives the names of my Advisory Board and 50 endorsing manufacturers. It's FREE. Clip, sign and mail coupon RIGHT NOW!

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Without obligation, send me a copy of "Radio's Future and Your Opportunity." I am interested in your training and the opportunities in the great field of Radio for the R-T-I Trained Man.

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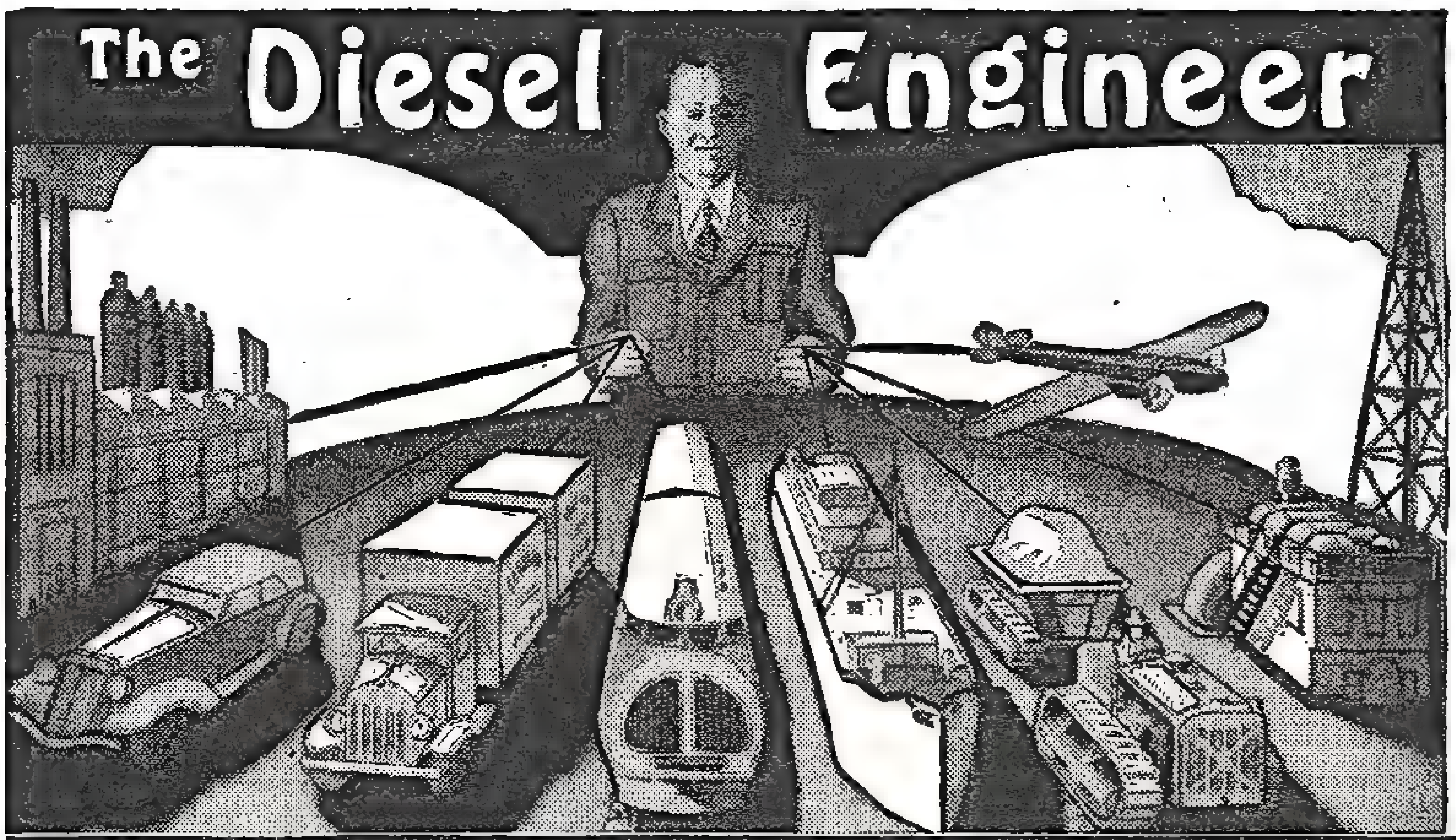

The Diesel Engineer

Is Your Job Safe?

Just as the gasoline engine changed or wiped out the jobs of thousands who depended on horse-drawn vehicles for their living—just as electricity changed the entire set-up in the fields of light and power—so now the Diesel engine is fast invading both the power and transportation fields, and threatening the present jobs of thousands of workers.

If jobs in your line are steadily growing scarcer, you owe it to yourself to investigate this new, progressive, uncrowded line, that in our opinion will offer good openings for the next 25 years.

2 Beginning Lessons in Diesel Engineering Free

Diesel—The New Fast-Growing Power

Diesel engines—because of their high efficiency, dependability, and economy of operation—are fast replacing steam and gasoline engines in power plants, motor trucks and busses, locomotives and ships, aircraft, dredges, drills, pumps, etc.—opening up an increasing number of well-paid jobs for Diesel-trained men. The field of Diesel Engineering is on the upgrade and continually expanding. It will provide steady employment, advancement and good pay for those properly trained in this new industry.

What This New Field Offers You

Now is your chance to get into a big new industry and grow up with it to an important position. Today there is practically no competition in the Diesel field, but the increasing use of Diesel engines will result in keen competition for jobs in the near future. By starting your training now, you can keep ahead of such competition.

You get complete information on all the latest Diesel developments—two- and four-stroke cycles; low- and high-speed and heavy duty types; Diesel-electric generating systems, etc.—in our course. Includes all text material—with special diagrams for quick understanding of this new power.

Get 2 Lessons FREE to Prove Your Own Possibilities in Diesel

Can you learn Diesel? We want to give the opportunity of finding out. So, *without cost or obligation on your part*, we will send you 2 beginning lessons. In the quiet of your own home, look them over. See how clearly all is explained—how thoroughly you grasp every point—how definitely you progress step by step—so that your knowledge of Diesel grows constantly. Making this simple trial may be the turning point in your life—so *write to us TODAY!*

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ENGINEERING, broadcasting, aviation and police radio, servicing, marine radio telegraphy and telephony, Morse telegraphy and railway accounting taught thoroughly. Engineering course of nine months' duration equivalent to three years of college radio work, School est. 1874. All expenses low. Catalog free. **DODGE'S INSTITUTE Fern St. Valparaiso, Indiana**

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Resilvering mirrors. Replating tableware, reflectors. Refinishing chandeliers. Making Chipped Glass Signs. Experience unnecessary. Combination outfit furnished. Write—SPRINKLE, Plater, 855, Marion, Indiana.

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Be the ONE Man in 1000 Who Can Service Modern Sets!

Modern circuits stump the old-time cut-and-try radio fixer. More puzzling complications are coming. Trained men with up-to-the-minute radio knowledge are urgently needed to service these new receivers. Such men can make up to $3 an hour.

No Past Experience Needed

Past experience counts for little at this time because changes in radio design are so swift and radical. That's why you, as an R. T. A. Certified Radio-Technician can quickly work up into the big money class. Write today for full particulars.

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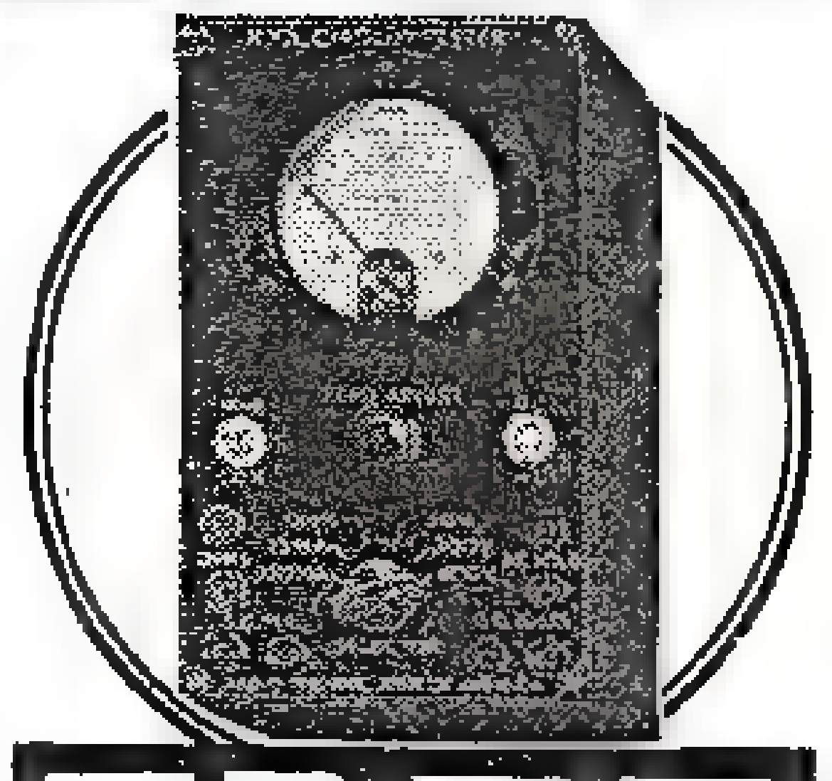
I have connected with a large firm as Radio Service Manager and wish to extend my thanks for your help.

JOSEPH RAPIEN, JR.

Ivanhoe, Virginia

Please rush the diploma to me at once. I am doing a good business in Radio, and I want to say again that I can't thank you enough for what you have done for me.

KOONTZ W. MARTIN



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To start you making money without delay we equip you with this Circuit Analyzer and Point to Point Resistance Tester.

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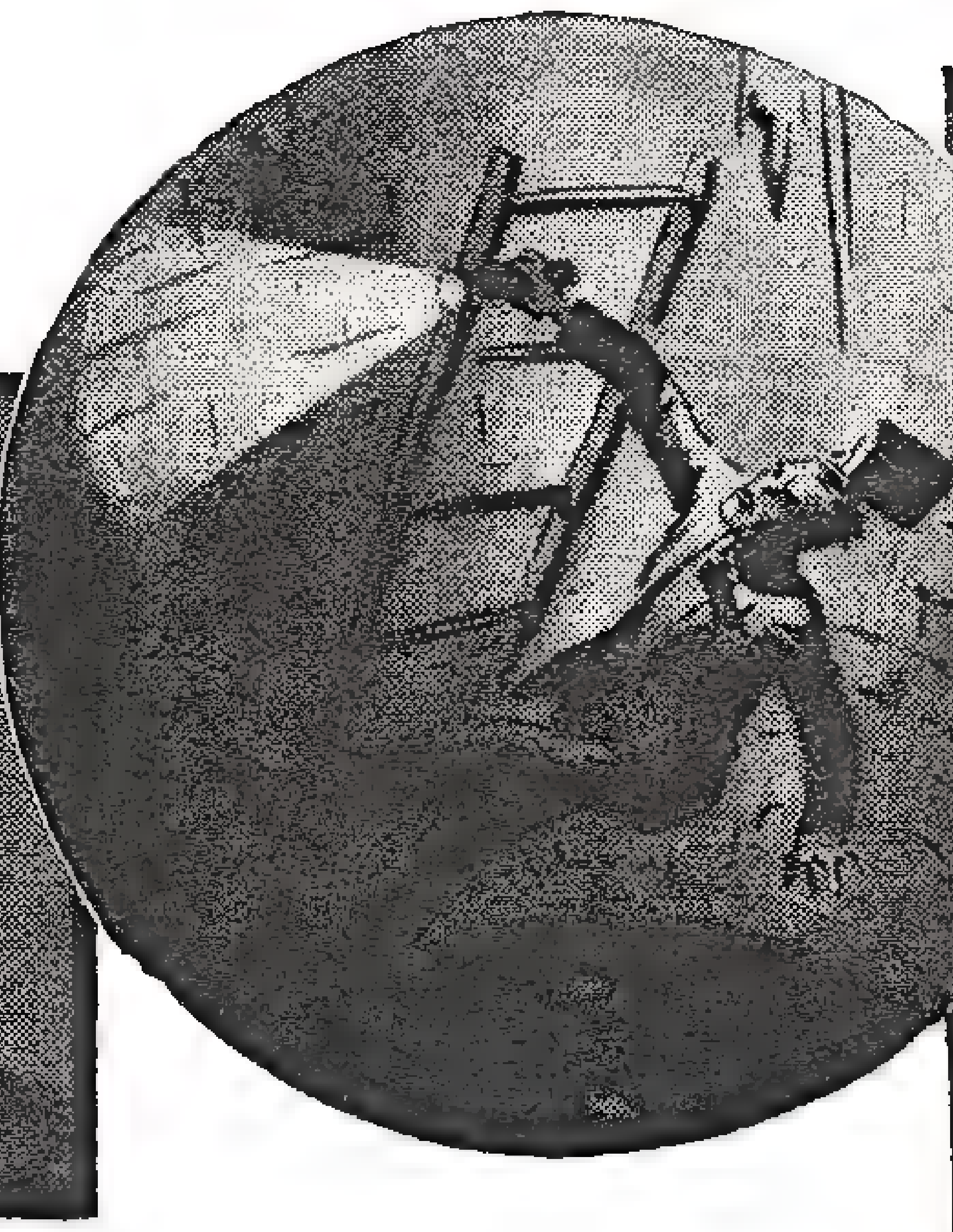
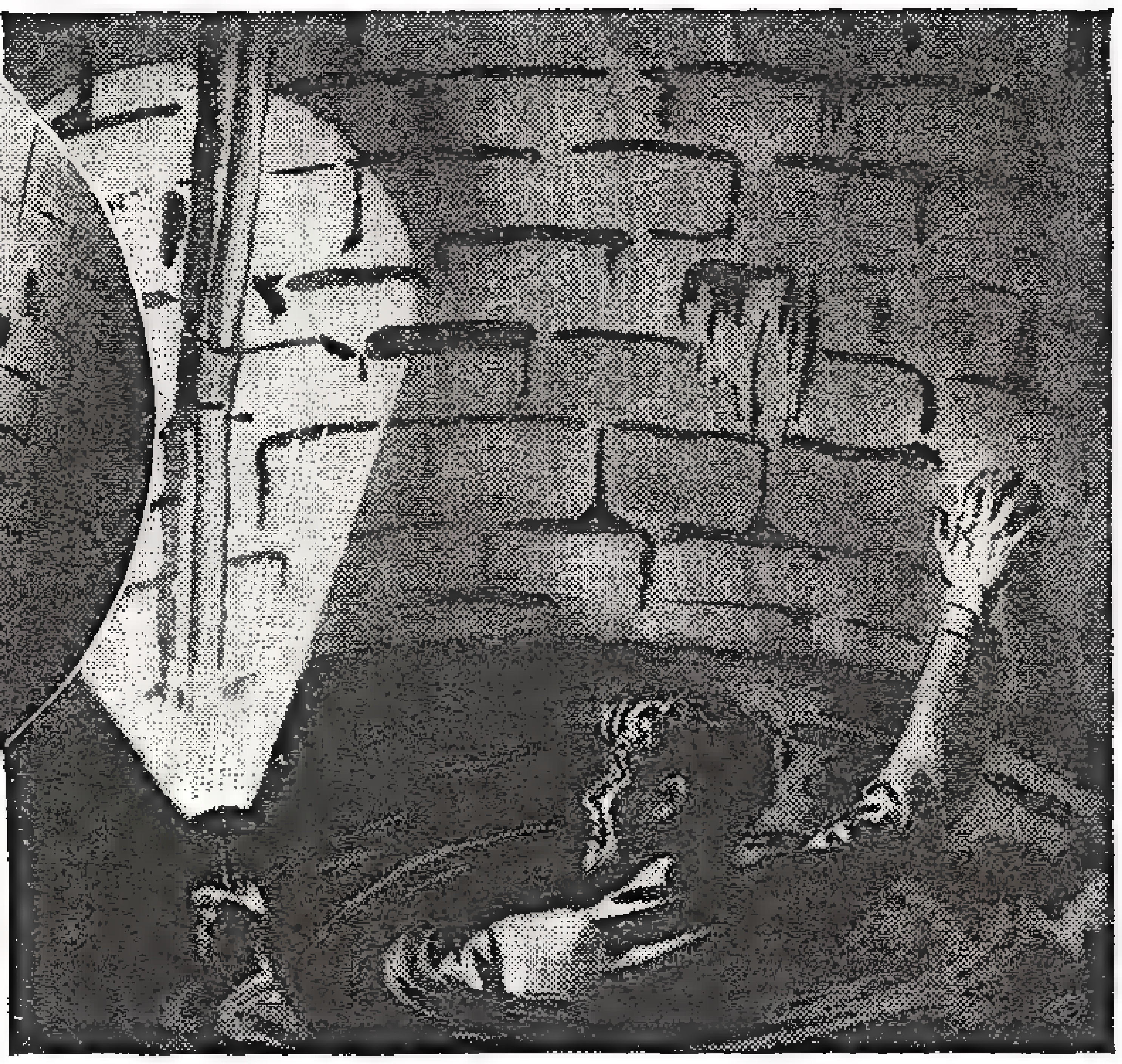
Well of the Padres His Living Tomb





San Diego Reporter, Weak from Loss of Blood, Cheats Death in Ancient Shaft

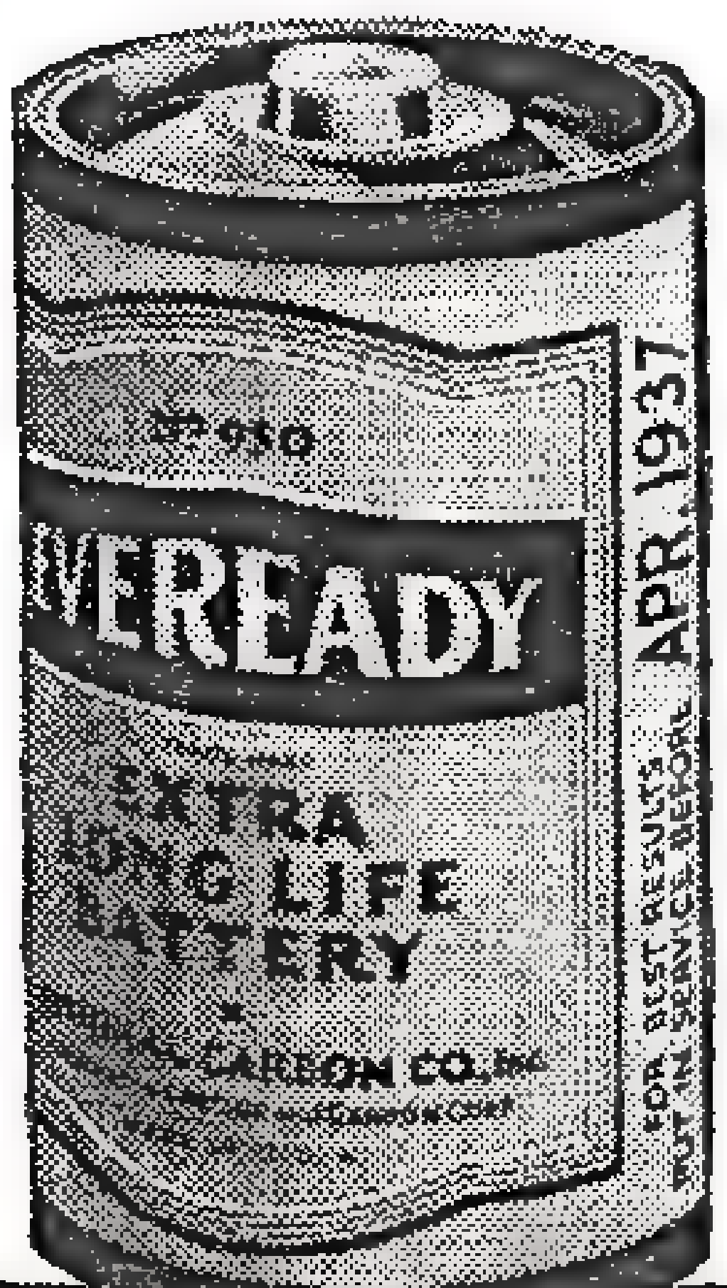
"For nearly two hundred years this death-trap had awaited its human prey...that was the grisly thought uppermost in my mind, as I fought for life in the ancient crumbling mission well of San Diego de Alcala," writes E. P. Lyle III.

"First, as I was climbing down to explore an opening at the water level, a loose tile struck me on the head; then the rickety ladder slipped, plunged me dazed and bleeding into the water.

"But I had clung to my flashlight and as the cold water cleared my senses, I could see it shining under the surface. Paddling to keep afloat, I swung the light as best I could around the well. A rusted old pipe attached to the wall offered a hand hold, and was stout enough to hold me as I fought off growing dizziness from loss of blood, and climbed hand over hand to where my companions could reach me.

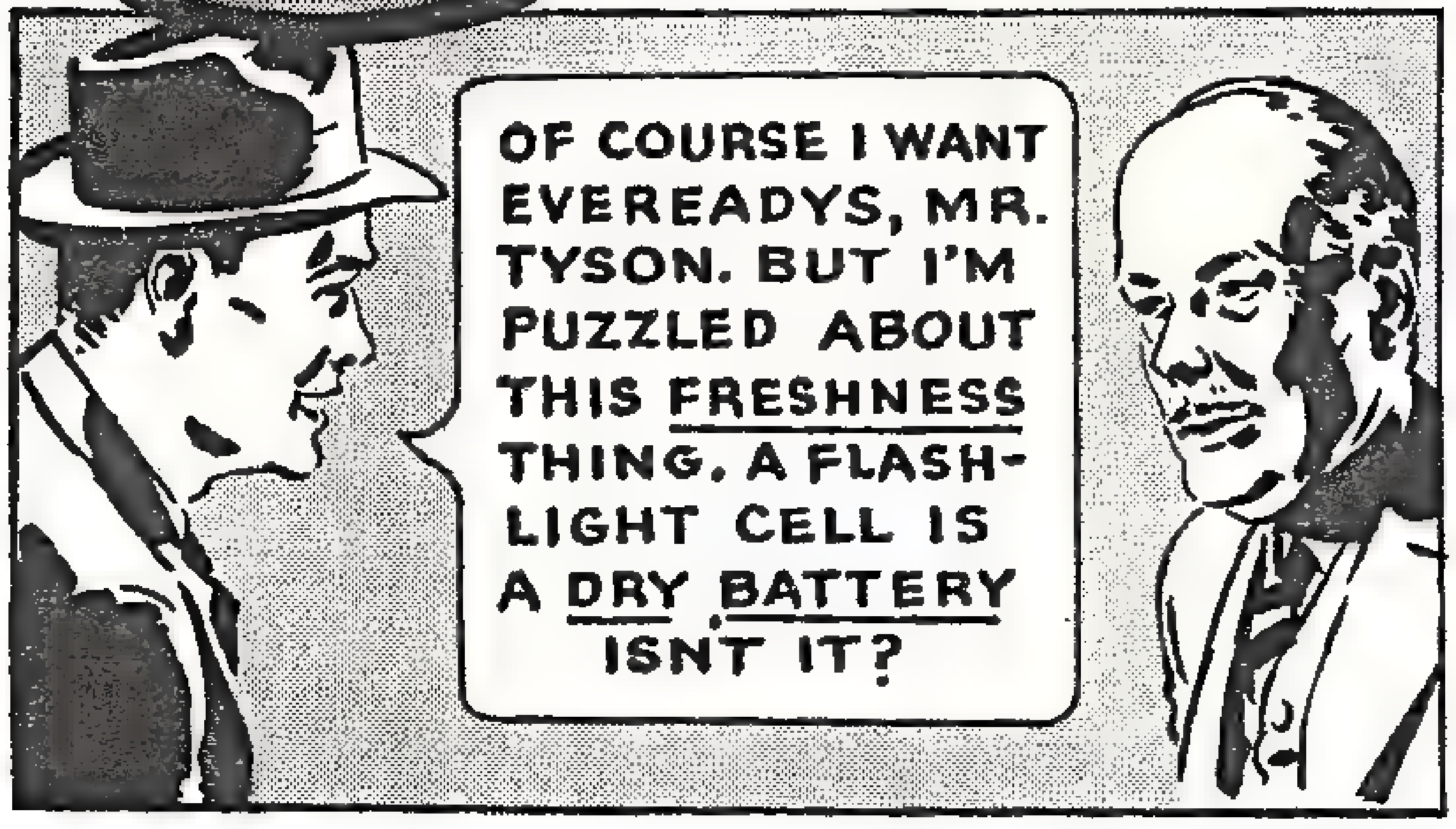
"They would have pulled a corpse out of that well if it hadn't been for the DATED Eveready batteries in my flashlight—batteries that were really *fresh* when I bought them months before. I would certainly have lost consciousness and drowned before my friends could have reached the mission (a quarter mile away) and returned with rope and a light."

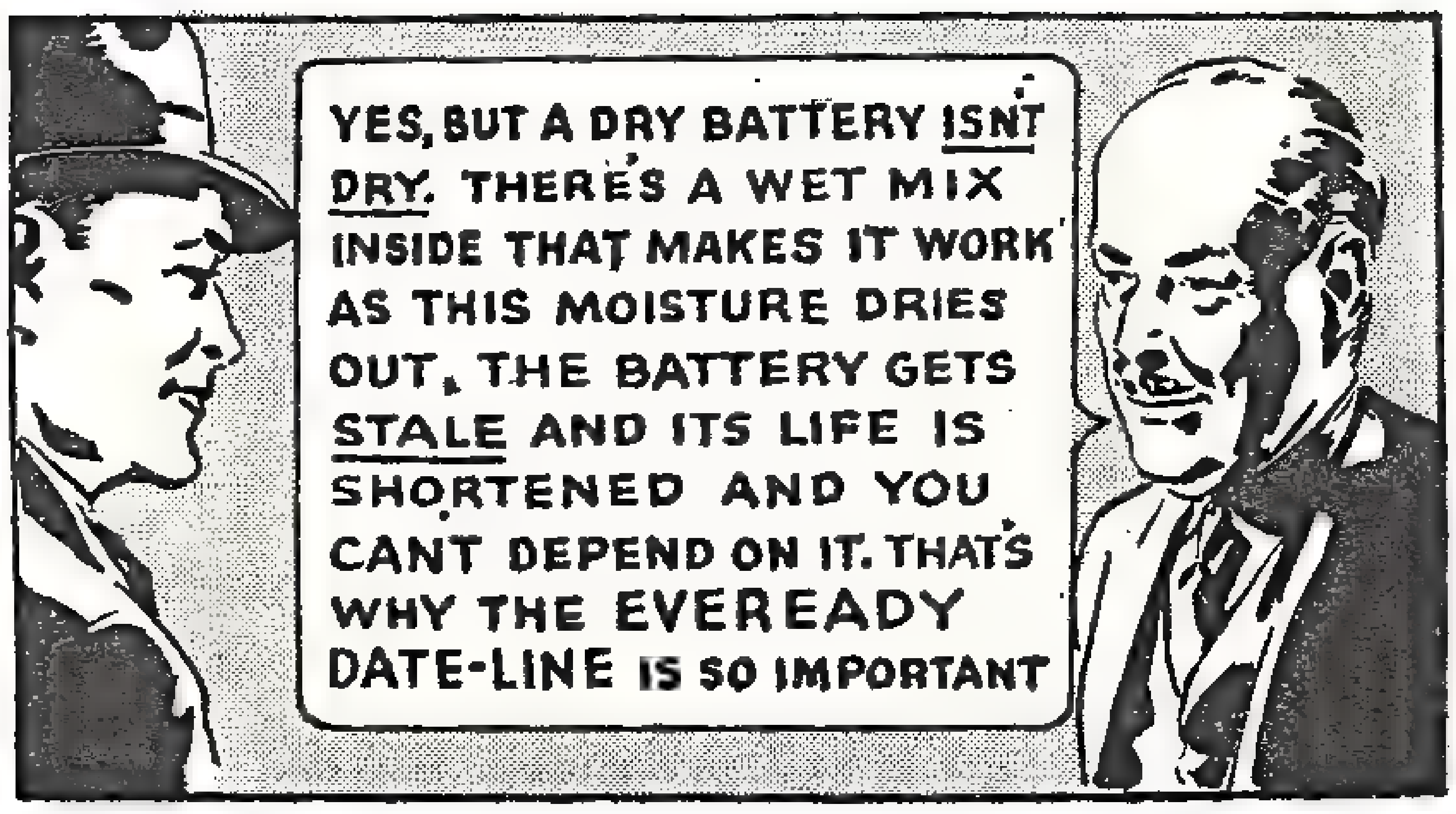
E.P. Lyle III


No. 950
EVEREADY
EXTRA LONG LIFE BATTERY
NATIONAL CARBON CO. INC.
APR. 1937
FOR BEST RESULTS

EVEREADY BATTERIES ARE *FRESH* BATTERIES

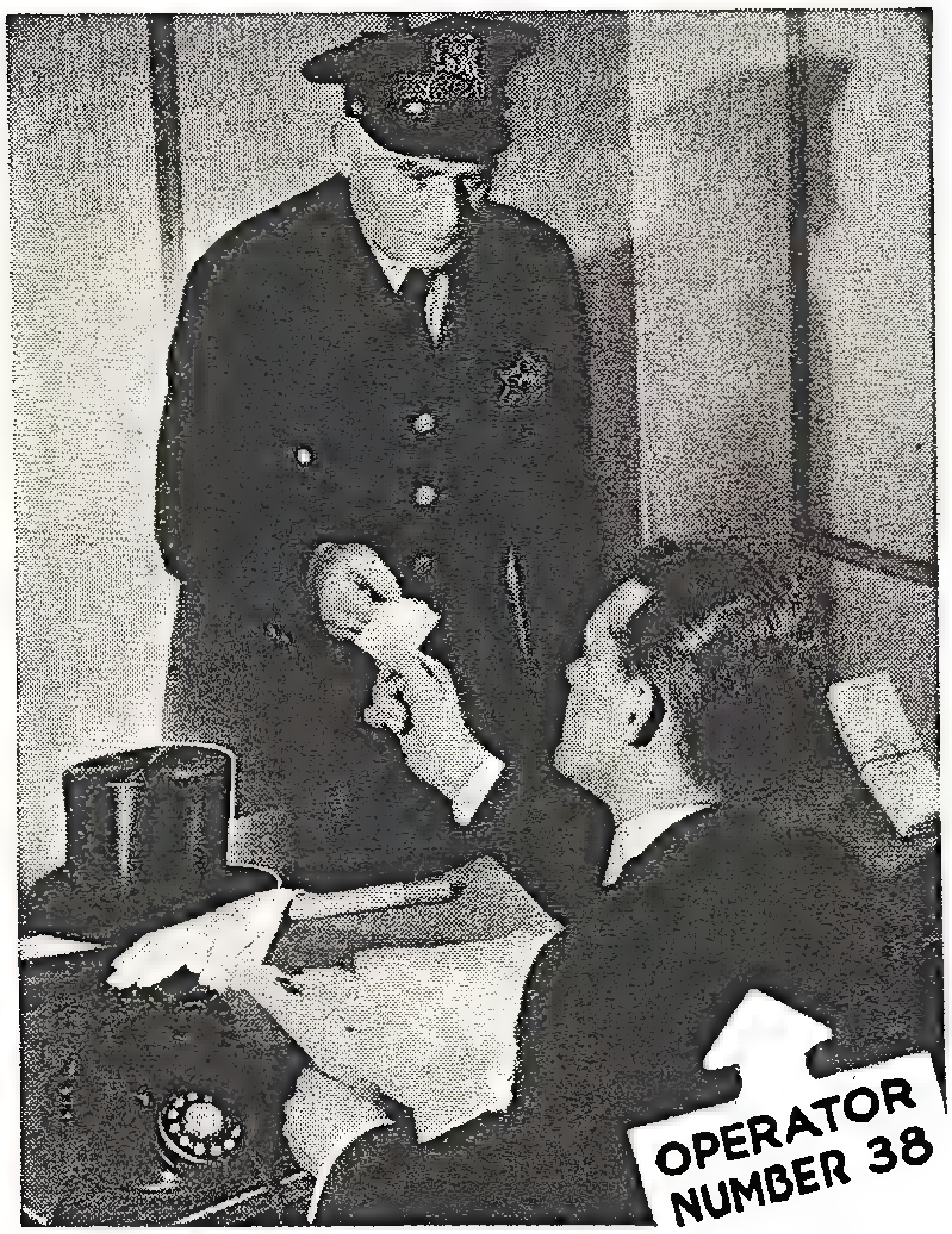
NATIONAL CARBON CO., INC., 30 East 42nd St., New York, N. Y.


OF COURSE I WANT EVEREADYS, MR. TYSON. BUT I'M PUZZLED ABOUT THIS FRESHNESS THING. A FLASHLIGHT CELL IS A DRY BATTERY ISN'T IT?


YES, BUT A DRY BATTERY ISN'T DRY. THERE'S A WET MIX INSIDE THAT MAKES IT WORK. AS THIS MOISTURE DRIES OUT, THE BATTERY GETS STALE AND ITS LIFE IS SHORTENED AND YOU CAN'T DEPEND ON IT. THAT'S WHY THE EVEREADY DATE-LINE IS SO IMPORTANT

Arrest Him, Officer!

I'LL HAVE COMPLETE FACTS ON THE OTHER FELLOW TONIGHT!



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Address ____________________

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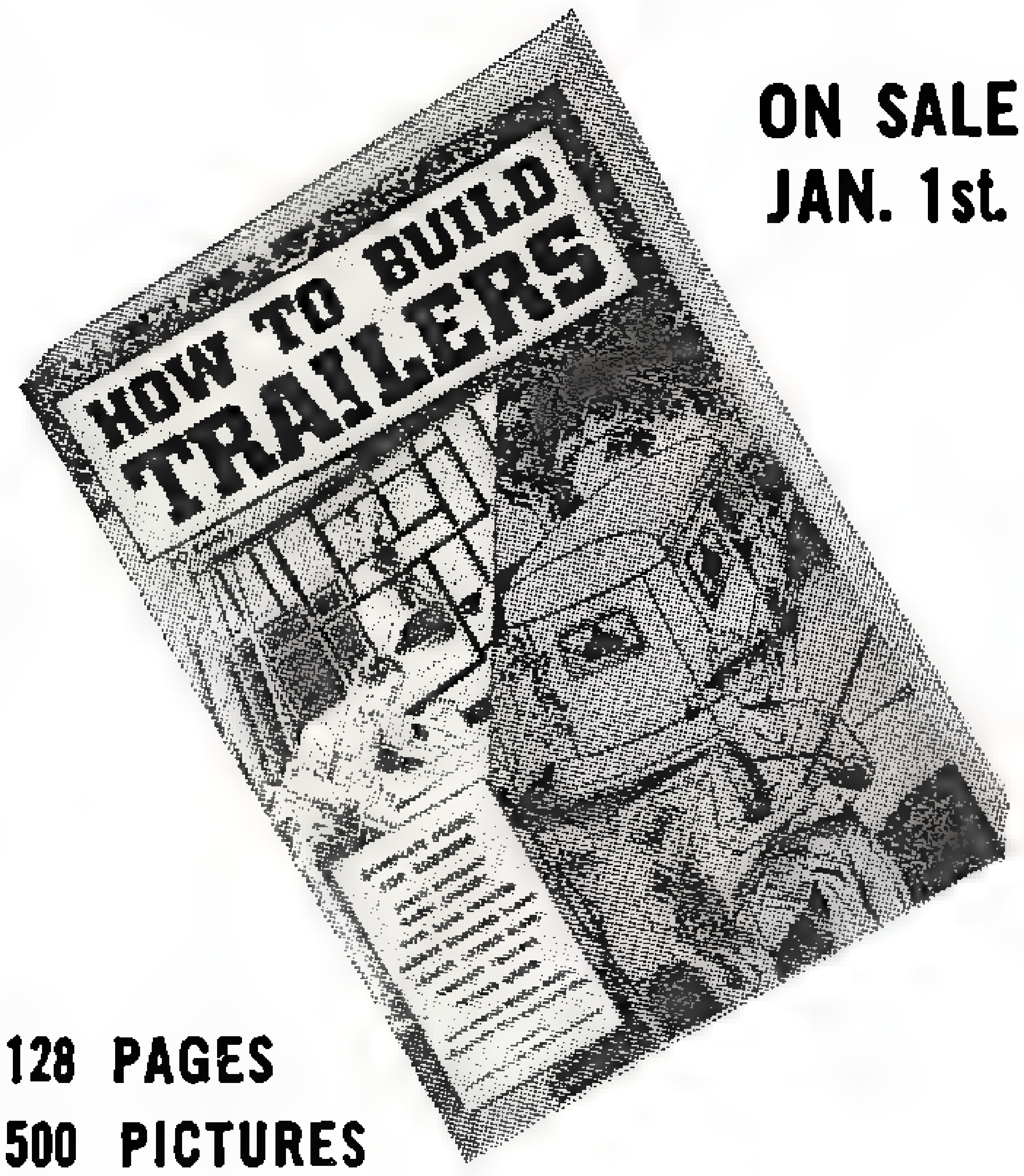

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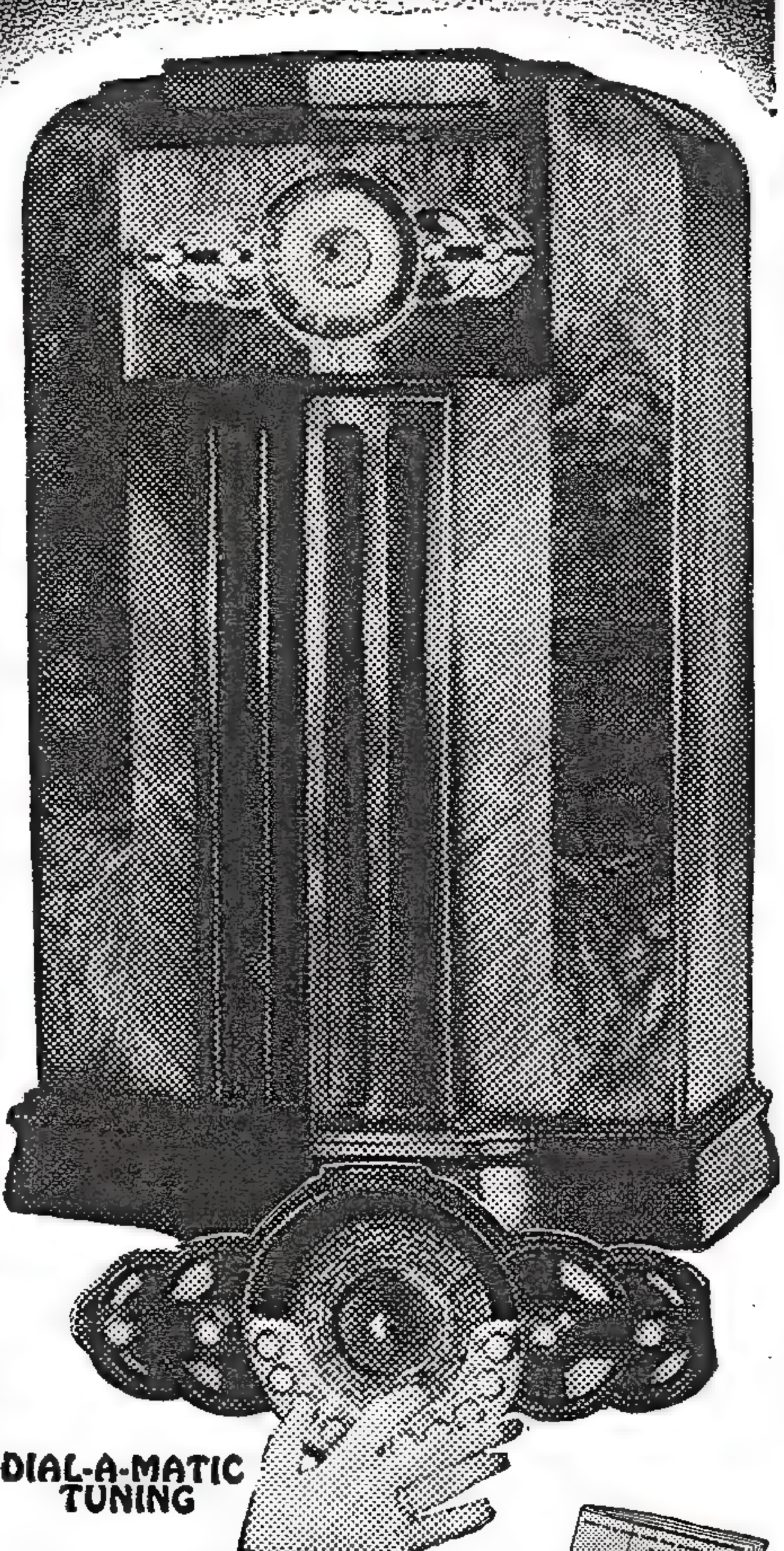

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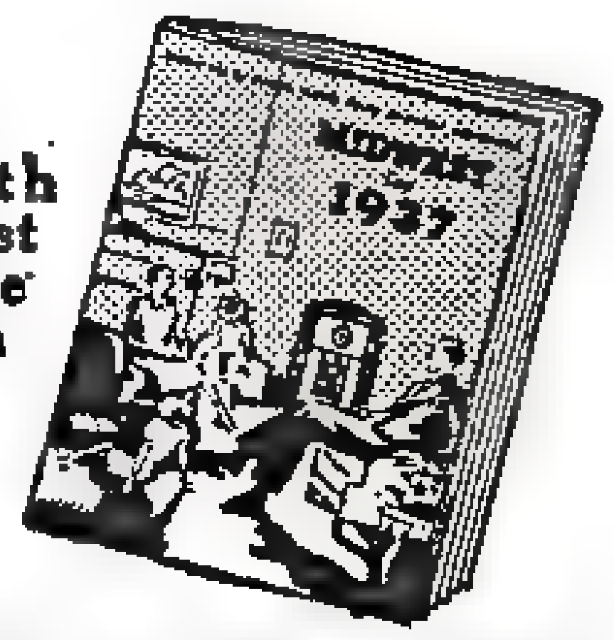

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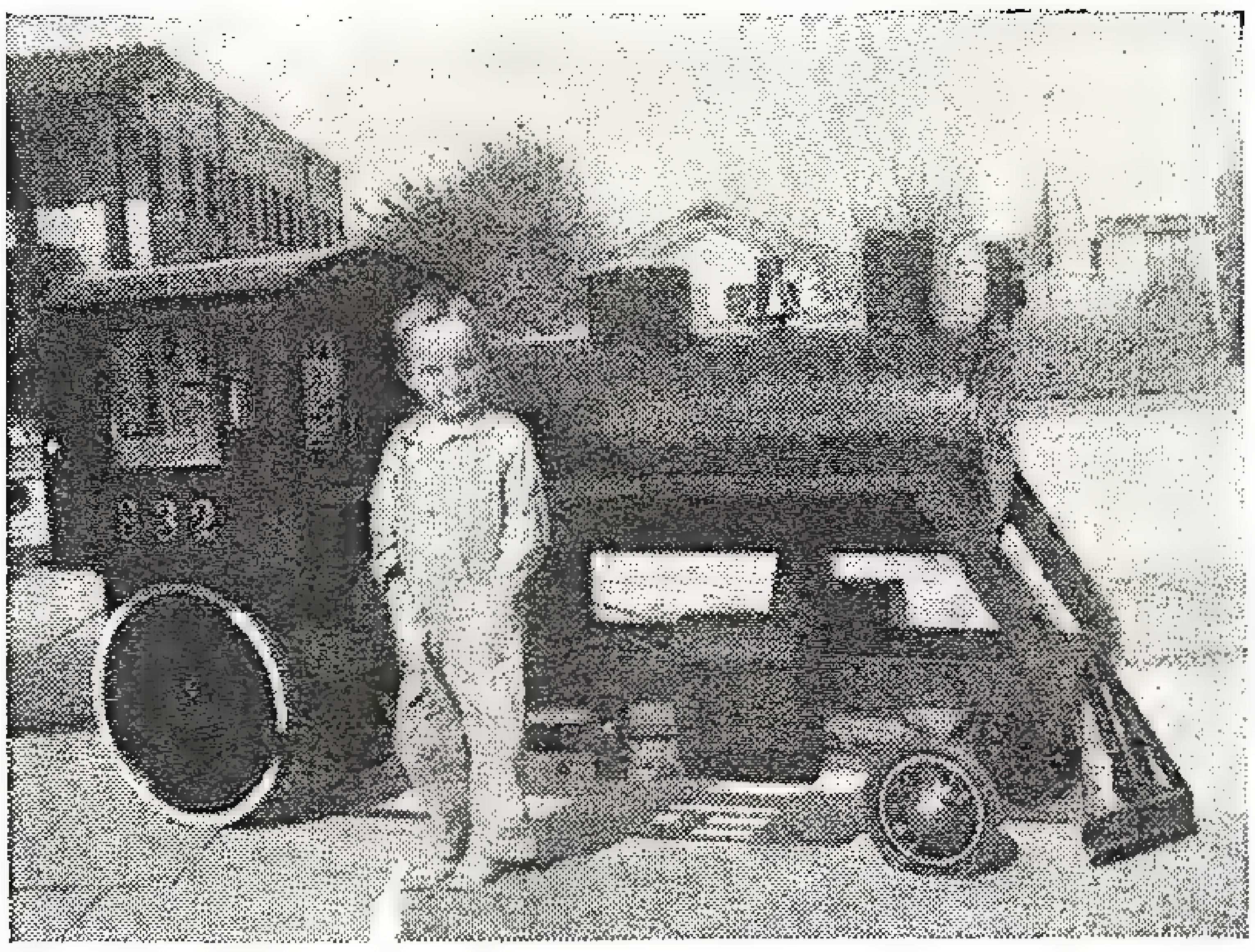


Equipped with ball bearing wheels, this miniature locomotive pedals as easily as a bicycle. E. L. Bowers, of Los Angeles, Calif., built it from MM plans for little Bobby, 5 years old.

ONE of our business friends has asked us to pick a list of the most important inventions of the past year. Here's our nomination: Rust cotton picker, sonic altimeter, telephone photo improvements, bacteria-killing tubes, television advances, new safety auto tires, defrosters and fog dispellers, the roadable autogiro.

Also: Metal spectrophotometer, improved steel alloys, advances in Diesels, air conditioning, plastics, textiles and glass; the solar heater, improvements in vacuum tubes, the photo-composing machine, power-alcohol plant. With close to 50,000 patents from which to choose, such a list has to be a matter of opinion and we may change ours if we go into this subject further. The merits of the Rust cotton picker, for one, are still a matter of considerable dispute in the South.

***

Topping the list of interesting projects and photos received this month is a letter from E. L. Bowers, of Los Angeles, Calif., who says:

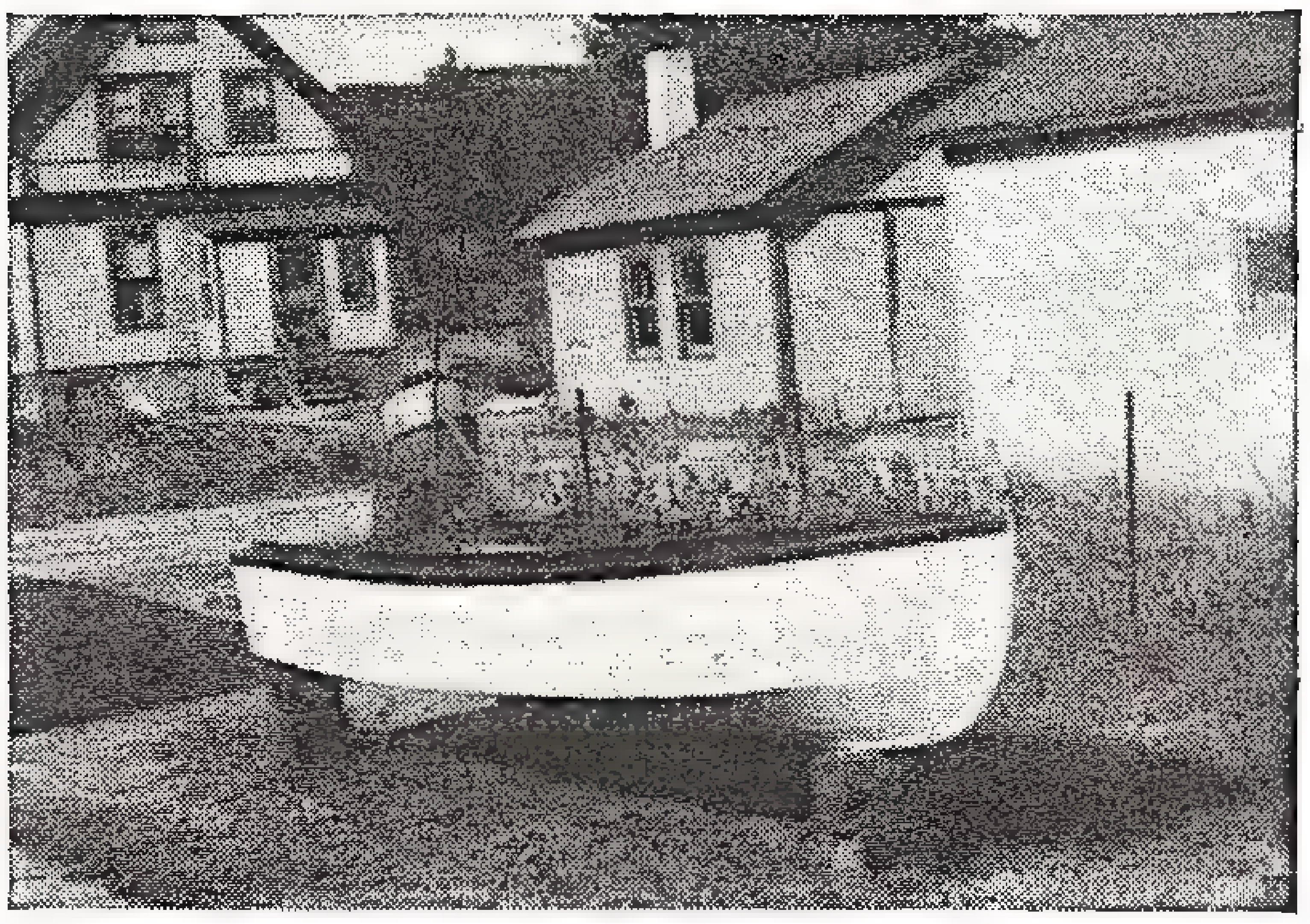
> Los Angeles, Calif.
>
> Dear Editor:
>
> Enclosed is a photo of a pedal locomotive made from plans in a recent issue of MM. It was made in a spare room without any special tools.
>
> The wheelbase is 60 inches, and the cab stands 42 inches high. Four small children can ride in it, and how they do pedal it around the block, halting traffic and creating great interest. You may be sure that 5-year-old Bobby, for whom it was built, is the most popular boy in Los Angeles.
>
> E. L. Bowers.

We certainly can appreciate that Bobby is popular in his neighborhood with such a fine model locomotive to travel around in. Mr. Bowers is indeed fortunate to have tackled a project that provides a double measure of satisfaction—the thrill of a workshop project well done, and the pleasure of having constructed something that brings joy to children. A $5 award was sent to Mr. Bowers.

***

To Steele Peterson of Duluth, Minn., goes $3 for his letter and photo of "Skedaddle," one of the many projects presented in the MM "How To Build 20 Boats" book. He writes:

> Duluth, Minn.
>
> Dear Editor:
>
> Enclosed are photos of the boat my father and I built from plans in the MM boat book. The boat was completed in six weeks using a limited number of tools. I cannot recall any other constructional project which we so thoroughly enjoyed. The cost of materials was only $30.
>
> We launched the boat in a rough sea and were agreeably surprised the way she handled. With a small outboard motor of slightly more than 3 horsepower, we made 12 m.p.h.
>
> I am pleased with MM plans because they are so clear that an amateur can easily follow them. I hope to see more plans for small boats in the next edition of your boat book.
>
> Steele Peterson.



In the short time of six weeks, using a limited number of tools, Steele Peterson and his father, of Duluth, Minn., constructed "Skedaddle" from plans printed in MM boat book.

the Editor's Workbench

Good work, Mr. Peterson. When such a seaworthy boat can be built for so little money we can readily understand why so many MM workshop fans are tackling boat projects at this time.

***

From Joseph Lovetri, of Raritan, N. J., comes a letter and photo describing a real good bob-sled project. He says:

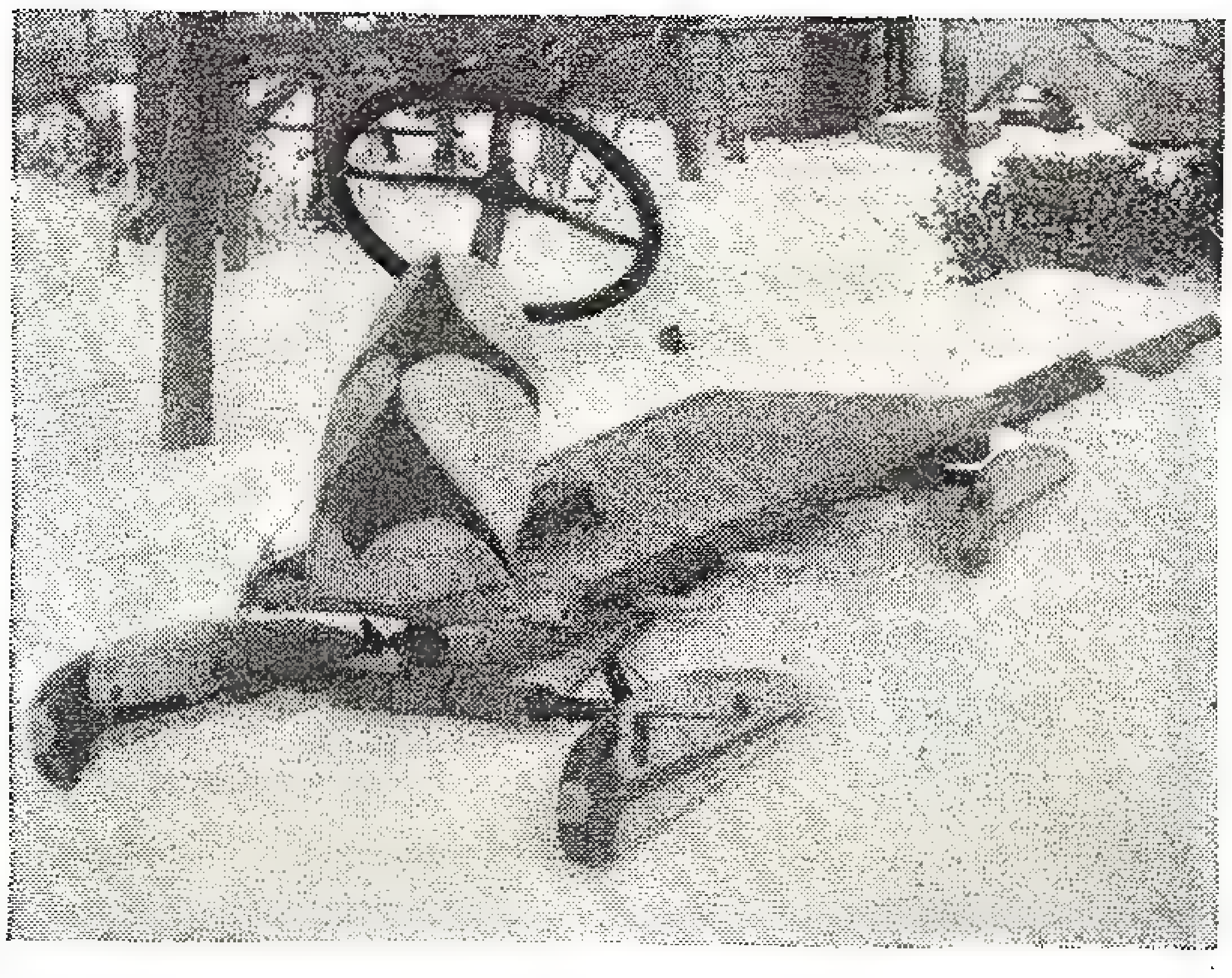
> Raritan, N. J.
>
> Dear Editor:
>
> Enclosed is a snapshot of my bob-sled. The sled is six feet long and I took your advice about using strap iron for the runners. It makes good speed.
>
> This is my third entry in the Workbench contest. I hope it reaches you in time for consideration this month.
>
> Joseph Lovetri.

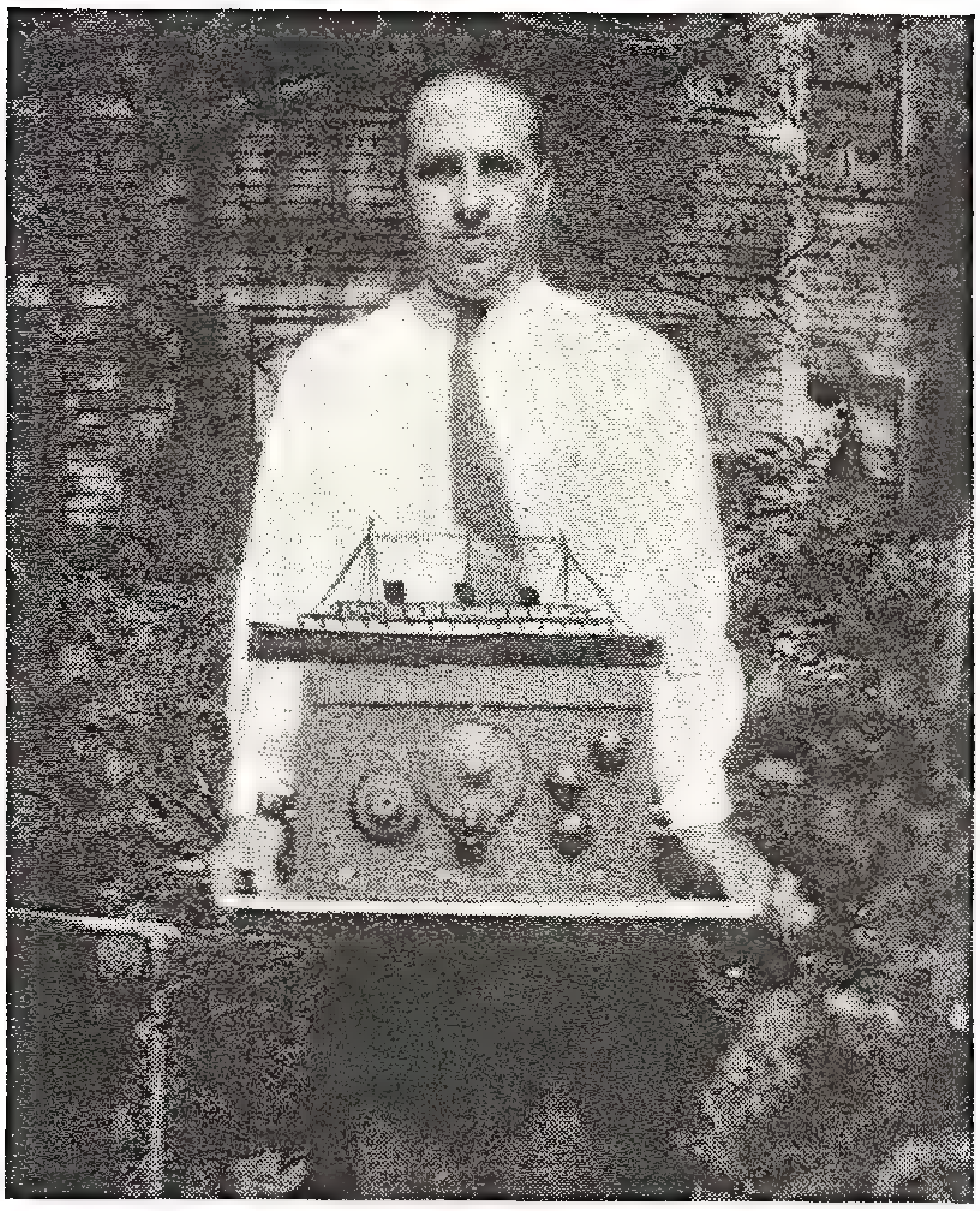
The bob-sled is a keen looking job as most MM readers will agree. A $3 prize was awarded for this letter and photo and since it was his third entry it proves that it pays to keep trying.

***

Showing aptitude for constructing projects of different types, John Marks, of Somerville, Mass., submitted a letter and photo that won an award of $3. His letter states:

> Somerville, Mass.
>
> Dear Editor:
>
> I have been reading MM for many years and think it is the best magazine of its type. It features plans for things to build that do not require a great expense. As yet, I have not found a single department that I haven't read over and over again.
>
> The enclosed photo shows a radio and a model of the "Queen Mary" that I built from MM plans. Since building the "Queen Mary," I have received orders from five people to build similar models for them so you can see that it must be pretty good.
>
> John Marks.


This six-foot bob-sled was built by Joseph Lovetri, of Raritan, N. J. Featuring an automobile type steering wheel and runners made of strap iron it seats three persons comfortably.


John Marks, of Somerville, Mass., exhibits two projects built from MM plans—a compact radio set and a carved model of the ocean liner, *Queen Mary*. He received orders for 5 models.

Congratulations to Mr. Marks for turning a hobby into profitable channels. We believe that many more MM workshop fans could turn their skill with tools into a source of income if an effort was made. With the money gained, a bigger and better workshop could be set up.

***

Readers who like to build speedsters will like the letter and photo submitted by Joe Lucan, of Wisconsin Rapids, Wis., who was awarded a $3 prize. His interesting letter states:

> Wisconsin Rapids, Wis.
>
> Dear Editor:
>
> Enclosed is a photo of my speedster which I built from my own design. The chassis is built entirely

[*Continued on page* 32]

There's Quicker, Bigger MONEY for YOU in POULTRY RAISING!

Wherever You Live—
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YOU Can Do What They Have Done

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"When I enrolled for your course, I knew nothing about poultry keeping. I am now successfully operating a commercial poultry farm." W. J. Warthen, Conn.

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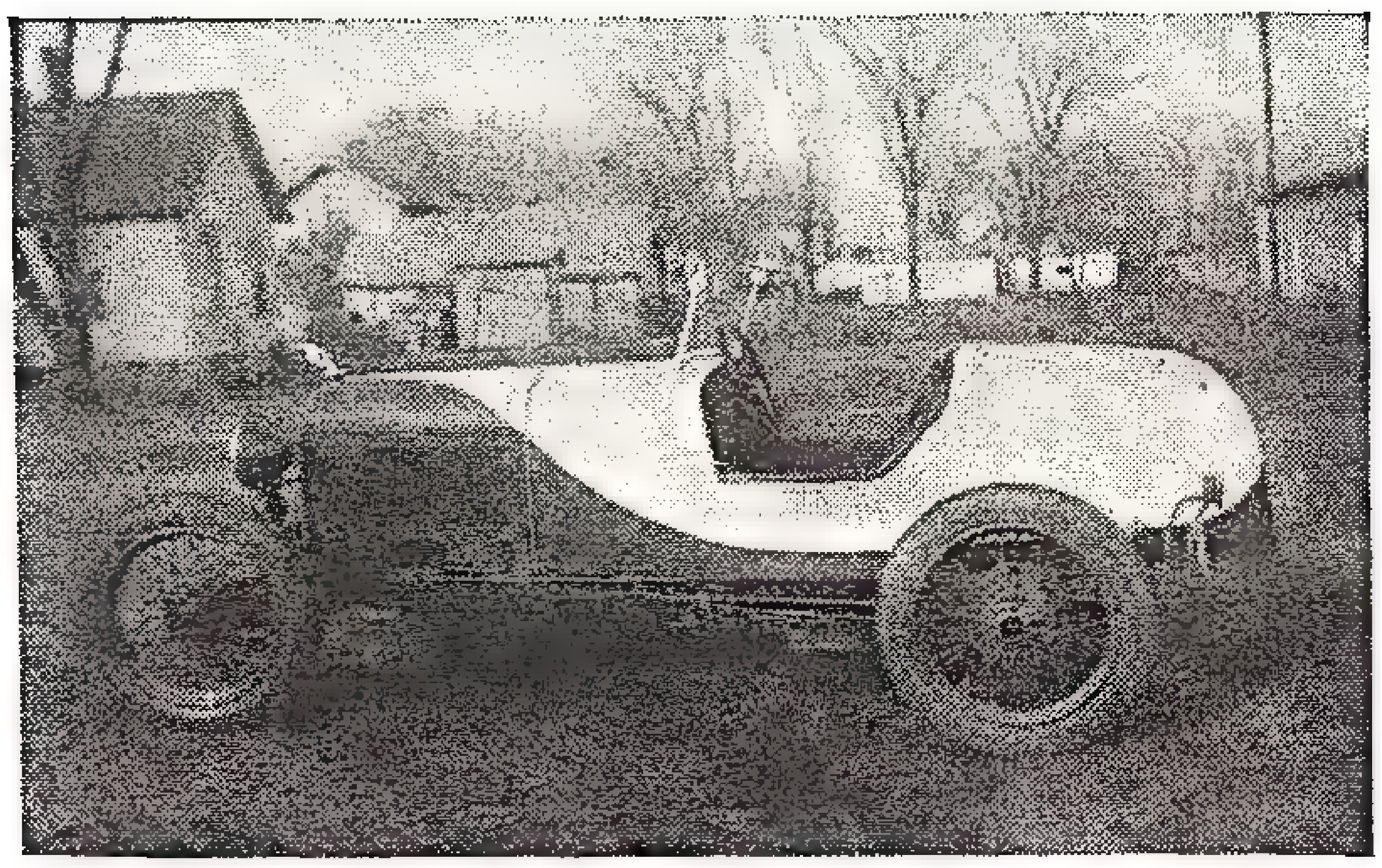
Editor's Workbench Chips

[*Continued from page* 31]



Using reconditioned parts from several used cars, Joe Lucan, Wisconsin Rapids, Wis., constructed this flashy speedster. It travels 70 m.p.h. and averages 30 miles per gallon of gasoline.

of used, reconditioned parts taken from Ford and Chevrolet autos. The body is of all-steel construction.

I have found it to be a very practical means of transportation as it will travel 30 miles on a gallon of gasoline and, in tests, has traveled at 70 m.p.h.

Joe Lucan.

Mr. Lucan's speedy little car is one that any auto enthusiast would be proud to own. Its clean-cut lines indicate that much care was taken in constructing it.

***

From far away Australia comes a letter that may interest many MM readers. It reads:

Waverly, Australia.

Dear Editor:

Having been a constant reader of MM for a long time, I would appreciate it if you would insert a notice requesting that amateur movie fans send their names to me. Thank you.

H. Wernard.

We are always glad to put hobby fans in contact with each other. Mr. Wernard can be reached at 75 Newland Street.

The long winter evenings afford ample time for tackling worthwhile projects in the home workshop. No matter what your interest, or how limited or extensive your skill with tools, you will find plenty of intriguing projects in every issue of MM. Besides current issues of MM, there are the popular MM books—"How To Build 20 Boats," "How To Build It," "Radio Builder's Manual," "Handy Man's Home Manual," and "How to Build Trailers," each 50c.

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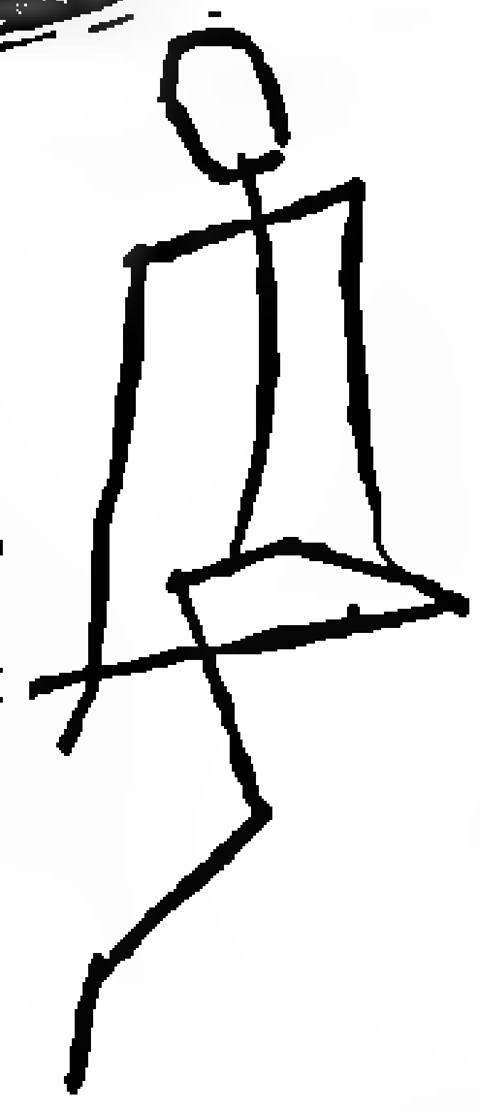
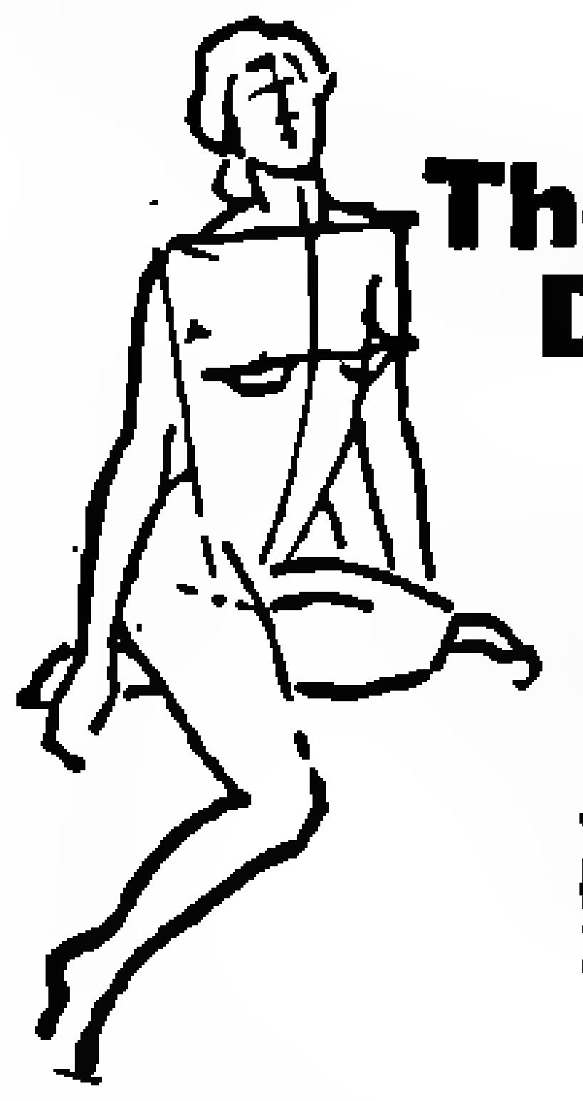


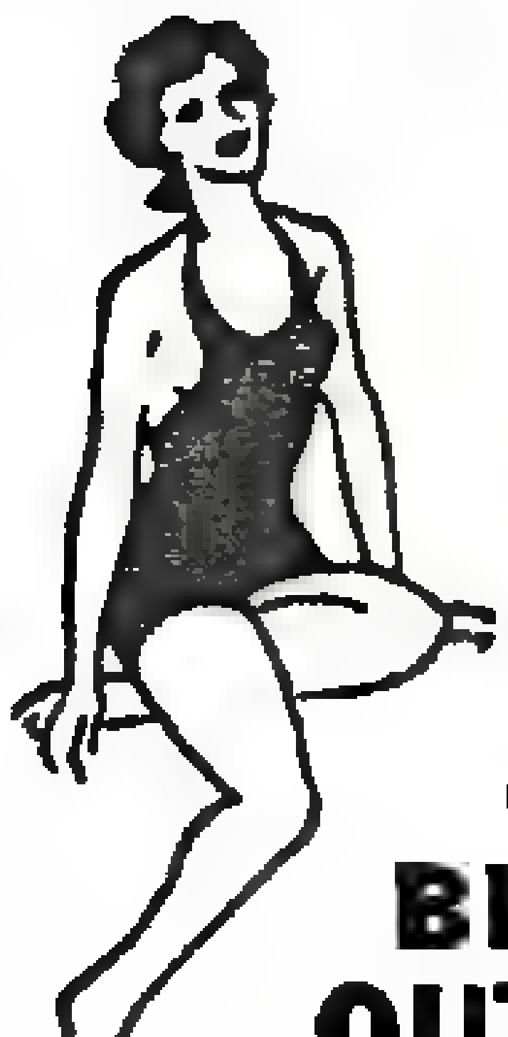
Just a few plain, quickly sketched lines—and you have the "framework" of a drawing. These first lines give you the rough proportions and lines of action.

Then YOU Can Do THIS . . .



Next we show you exactly how to apply the rules for developing the outlines and "blocking in" the areas to be shaded. Then you erase the first "framework" lines and presto!—you have this!

. . . and THIS!



Now you are shown how to give your drawing shape, depth and form by shading and high-lighting. In every single step you are guided by proven rules which correct your mistakes and skillfully direct your hand!

Made $125 a Week!

Joe Rinaldi of New York writes: "Since completing your course I have earned as high as $125 a week.

$3,000 for W.R.K.

"Just signed 2 contracts that will bring me $3,000. Earned $280 while taking course. Have more orders than I can accept."—W. R. Kent, Newark, N. J.

$3,000 a Year and More!

M. A. Kraykovic writes: ". . . salary averages $2,000 to $3,000 a year and more. It is a pleasure to recommend your course."

$100 for 8 Hrs. Work

"Have received for some of my paintings as much as $100 for 6 to 8 hours' work."—D. P. Harris, N. Car.

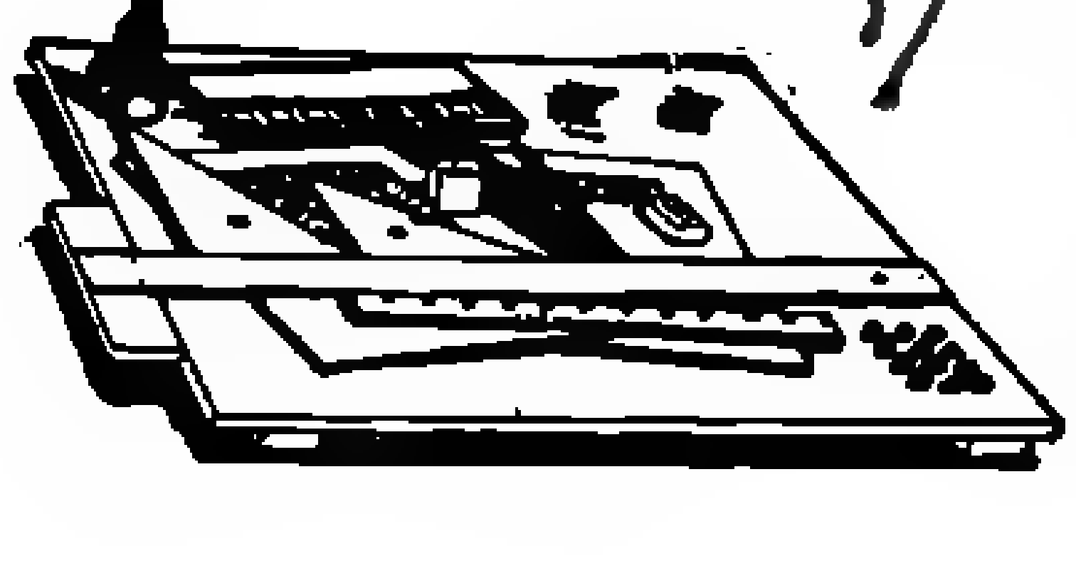
$50 for One Drawing

"Got $50 for a simple idea, expressed in a pen and ink drawing. Have made over $200 so far." — G. Bartolomi, Oregon.

$76 a Week

—that's what our student, H. J. Aigeldinger, of Penna., averages. Has made over $1,200 in spare time.

BIG ARTIST'S OUTFIT GIVEN!



This full-size professional Artist's Outfit comes with your very first lessons—at NO EXTRA COST. It contains everything you need to start. Mail coupon now for complete details of this remarkable offer.

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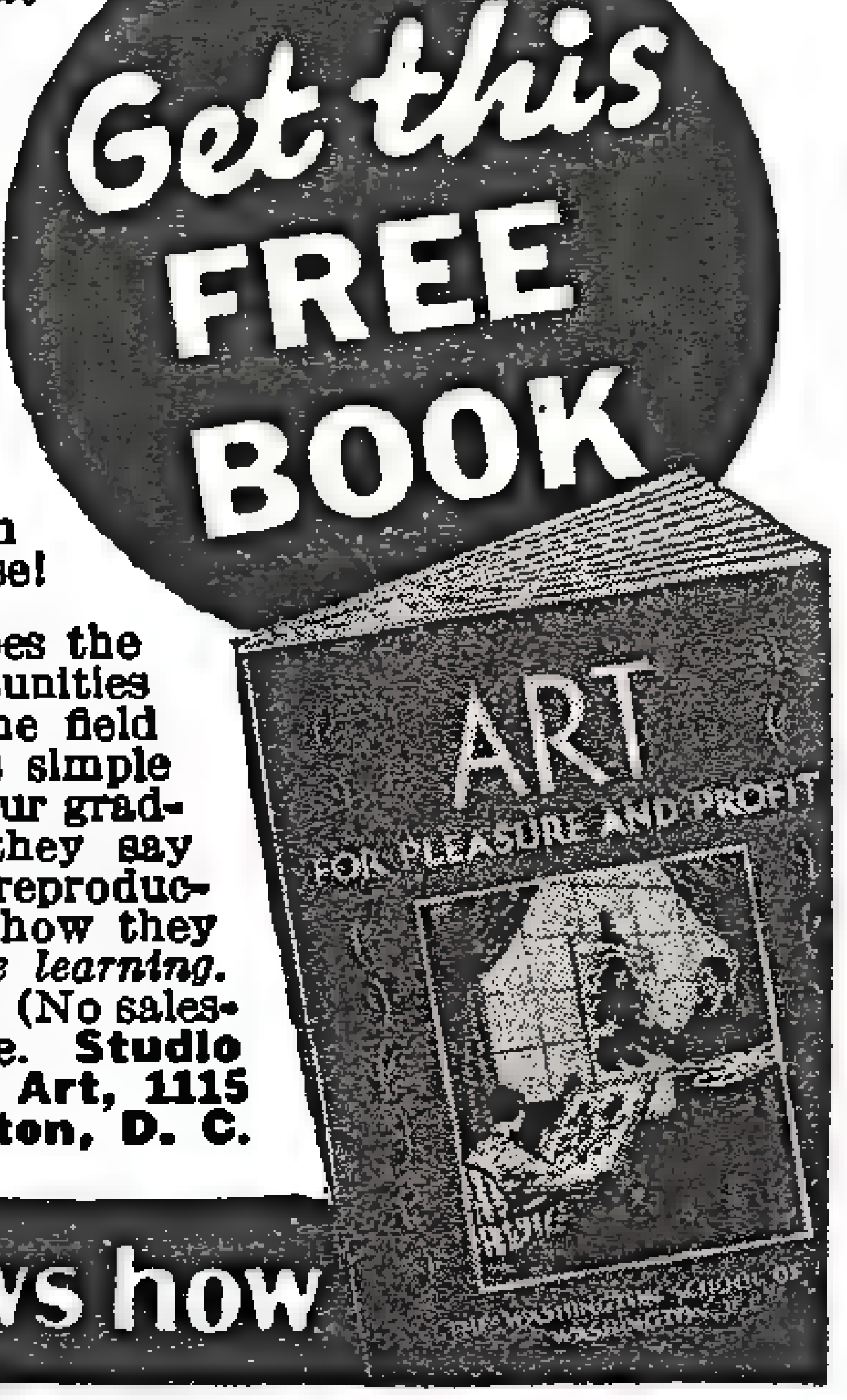
It's like an enjoyable game when you learn to draw with this simple method. You study right at home, yet every bit of your work receives the **individual** attention and criticism of a *real art teacher*. It's almost as though you had your instructor standing at your elbow while you work.

With this training you progress in easy stages. Starting with straight lines and curves, you learn action, perspective and all the more advanced principles of drawing. You get a sound, complete, all 'round art training based on our 22 years of successful teaching experience. See (at the left) the money others have made even *before* they finished the course!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BUT NOW
JUST THINK, DARLING, IN A FEW DAYS WE'LL BE MARRIED!

Posed by professional models

NEW DISCOVERY GIVES THOUSANDS 10 TO 25 POUNDS — *in a few weeks!*

IF you seem "born to be skinny" —if you've tried everything to gain weight but with no success — here's a new scientific discovery that has given thousands of happy men just the pounds and solid heftiness they wanted — *and so quickly they were amazed!*

Not only has this new easy treatment brought solid, naturally attractive flesh, but also normal color, new pep, and the many new friends these bring.

Body-building discovery

Scientists recently discovered that thousands of people are thin and rundown for the single reason that they do not get enough Vitamin B and iron in their daily food. Without these vital elements you may lack appetite, and you don't get the most body-building good out of the food you eat.

Now one of the richest known sources of Vitamin B is cultured ale yeast. By a new process the finest imported cultured ale yeast is now concentrated 7 times, *made 7 times more powerful.* Then it is combined with 3 kinds of iron, pasteurized whole yeast and other valuable ingredients in pleasant tablets.

If you, too, need these vital elements to aid in building you up, get these new Ironized Yeast tablets from your druggist today. Note how quickly they increase your appetite and help you get more benefit from the body-building foods that are so essential. Then day after day watch flat chest develop and skinny limbs round out to natural attractiveness. See better color and natural good looks come to your cheeks. Soon you feel like an entirely new person, with new charm, new personality.

Money-back guarantee

No matter how skinny and rundown you may be from lack of sufficient Vitamin B and iron, these new "7-power" Ironized Yeast tablets should aid in building you up in just a few weeks, as they have helped thousands. If not delighted with the benefits of the very first package, your money instantly refunded.

Only be sure you get genuine Ironized Yeast. Don't let anyone sell you some perhaps cheaper yeast and iron tablet, which is not the original Ironized Yeast that has been so successful. Look for "IY" stamped on each tablet.

Special FREE offer

To start thousands building up their health right away, we make this FREE offer. Purchase a package of Ironized Yeast tablets at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body." Remember, results with the very first package—or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 562, Atlanta, Ga.

This ELECTRIC AGE

A Guest Editorial

—*Bachrach Photo*

Morris L. Cooke

FARM drudgery must go.

The application of electricity is eliminating needless human toil from industry. The heavy work in our factories—lifting and pushing and cranking—is more and more being turned over to electricity.

Electricity pumps water, runs great urban transportation and communication systems, and otherwise makes it possible to live comfortably in our complex metropolitan centers. The efficiency of the modern assembly line is a direct result of this widespread use of electric power.

With electric power the city housewife no longer dreads the "Blue Monday" laundry day. Her daily chores and the spring and fall housecleanings have been reduced because of the electric refrigerator, vacuum-cleaner, electric washer and ironer, and above all, an abundance of running water.

Electricity promises even greater advances in agricultural processes and living standards than it has brought about in industry and in city homes.

During the past half century—the period of great electrical development—we did no more than a 10 per cent job of electrifying our rural areas. It is strange that some seemed to believe that the saturation point in rural electrification had been reached. A saturation point, when dynamos supply only 3 per cent of the power which agriculture uses, as compared with 80 per cent of industrial power!

Today, however, a different picture is being drawn. Encouraged by Federal, State and local assistance, farmers are demanding power. They will be served in one way or another. Utilities, both public and private, are conscious of this demand, and rural expansion is the order of the day throughout the power industry. More and more the utilities are realizing the vast potentialities of the rural market.

With the assistance of power, the farm will be a much happier and more pleasant place to live. Power will prove to be one of the farmer's greatest comforts and his most untiring hired hand.

Morris L. Cooke

DIRECTOR

Rural Electrification Administration

Equipment for MM

by Wesley Sherwood Bessell

New York Architect

Wesley Sherwood Bessell, New York architect, who has designed model $3,500 home Modern Mechanix magazine is building in Leonia, N. J.

"Maybe dreams do come true—if you dream them hard enough," Mary chuckled as she and Tom watched their home rise from a hole in the ground to the shingled roof. Mary still could hardly believe it was true. She remembered that hot afternoon in the cramped, stuffy flat when Tom and Jim were idly discussing the fond but seemingly futile hope of some day owning their own homes. They wanted spare room for their hobbies—Tom was an amateur photographer, and Jim liked to find his fun in a home workshop; they yearned for fresh air and quiet, away from the bedlam of the city in which they had to spend all their working hours. But a home in the suburbs, it seemed to them, was for the rich only.

It was true that Tom, a clerk earning $1,200 a year, had managed to save $1,600—but who ever would think of trying to buy land and building a home on that much? Jim had a small grocery, and was a little better off. He had $3,000 in the bank, but he also had two children for whom to provide. Then Bill Johnson, a mutual friend who worked in an architect's office, showed them how they could own their own homes and pay for them as they went along by borrowing from an independent building and loan association or one connected with the Federal Housing Administration or the Federal Home Loan Bank. It was as simple as that.

Tom and Mary's home—a one-story, four room house costing $3,500 in Leonia, N. J., a few minutes from the George Washington Bridge connecting New York City and New Jersey—has been selected as the model home now under construction for Modern Mechanix Magazine.

To build his home on a $600 lot, Tom borrowed $2,870, to be paid back at $29 a month over a period of ten years. Jim, building a two-story, five room house costing $5,500, borrowed $4,410, which he must pay back at the rate of $45 a month in the next ten years. It was, Bill pointed out, cheaper than rent.

IT HAD been difficult for Tom and Jim to keep their minds strictly on their jobs in the city while their thoughts kept drifting across the Hudson River, to where their homes were fast rising under the bang of hammers and the buzz of saws. Their wives—intrigued with visions of life out doors in the garden during the hot summer and with the thought of curling, cosy and comfortable, before an open fire of a winter evening—commuted almost daily over the George Washington Bridge to watch the carpenters, steamfitters and electricians at work. They felt almost personally acquainted with every nail driven into the house timbers.

Tom and Jim managed to get over as often as they could after work and on week-ends.

After one visit, when the homes were nearing completion, Tom chuckled: "When I looked at the excavation, and after the framework went up, I was terribly worried about the size of the houses—they looked so small, I couldn't see how anybody could live in them!"

"That's funny," replied Jim. "I had the same feeling. I began to wonder if the architect hadn't made some mistake in the measurements, or if the carpenters had mistaken feet for inches on the plans."

"That's the reaction of almost everyone who builds," Bill explained. "During the time that you see only the rough outline of the house, and until the rooms are white plastered, there are no ways to compare sizes, and everything appears much smaller."

"By the way, Bill," asked Tom, "can I keep this sketch of the living room, showing the fireplace?"

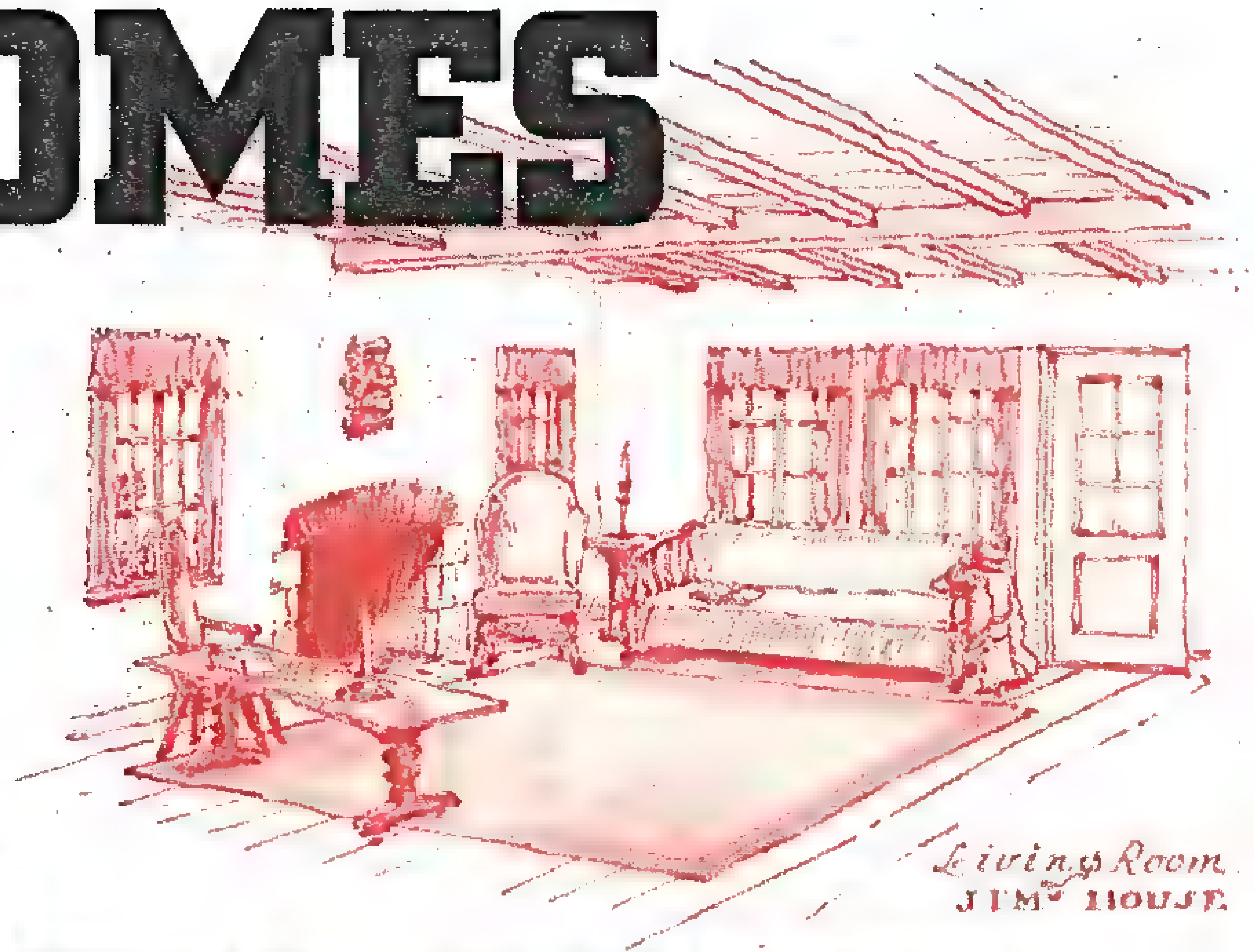
"I'd like the sketch you made for me, too," added Jim. "The wives want to frame them."

Bill proudly handed over the sketches. Then: "Now both you two bring your missus to the office tomorrow and we'll go out and select your plumbing and hardware fixtures."

Tom and Mary and Helen and Jim visited several plumbing supply showrooms with Bill. There were small rooms, fixed up like model bathrooms to show just how the fixtures would actually look when installed.

Model HOMES

The architect gives expert advice on equipment, from stoves to wallpaper, and advises on color schemes that won't frazzle nerves.



Top—The living room in "Jim's home" which is costing $5,500 to build through a $4,410 loan, payable at $45 a month over ten years. Below—Workmen place foundation walls in excavation of "Tom's house", as architect and proud home owners consult the plans.

They each made a careful selection to match their individual color schemes.

Next came the selection of hardware, which was made easy by the way it was displayed on mounted doors and window sections.

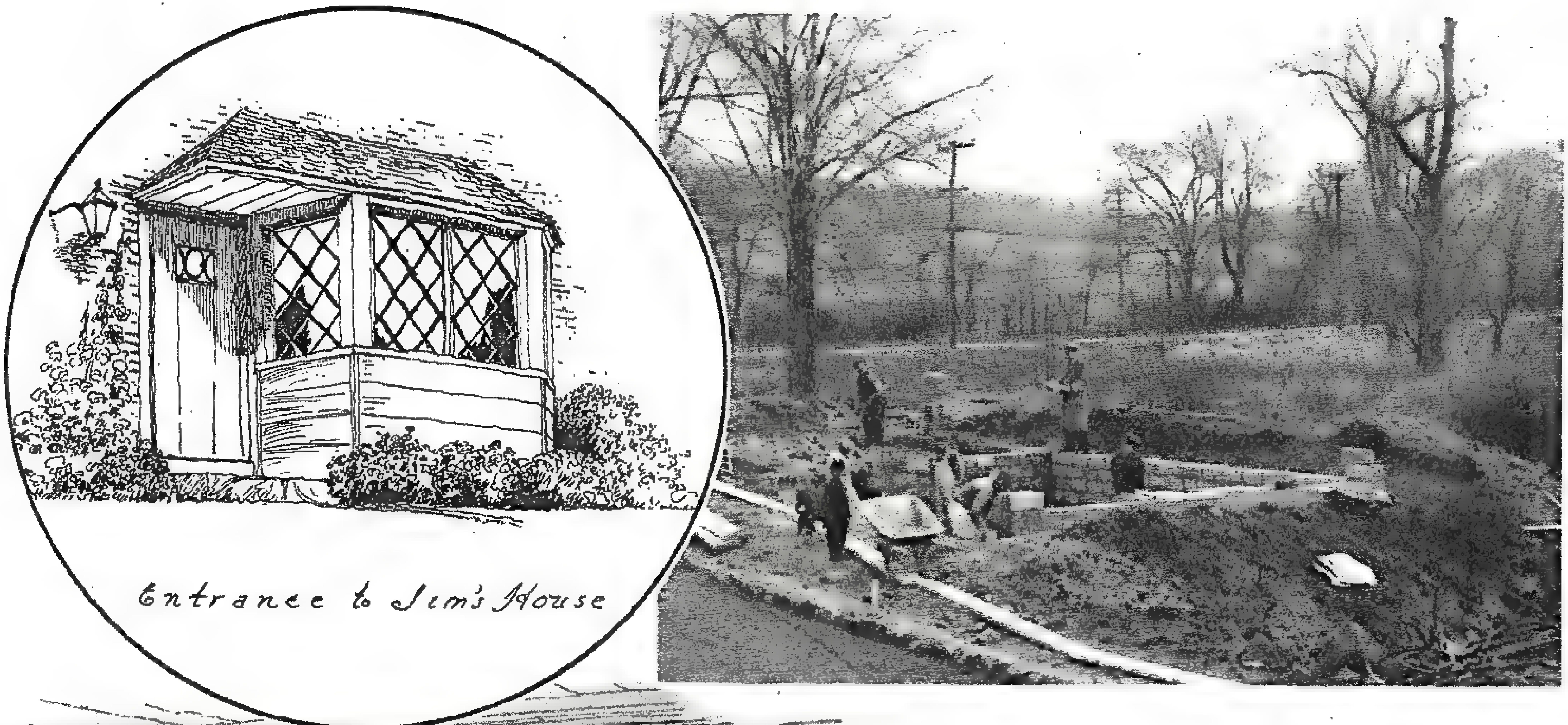
Selection of gas ranges, lighting fixtures and kitchen cabinets took another day.

"Goodness! What a raft of fixtures," exclaimed Mary. "I'll never be able to make a decision out of all this!"

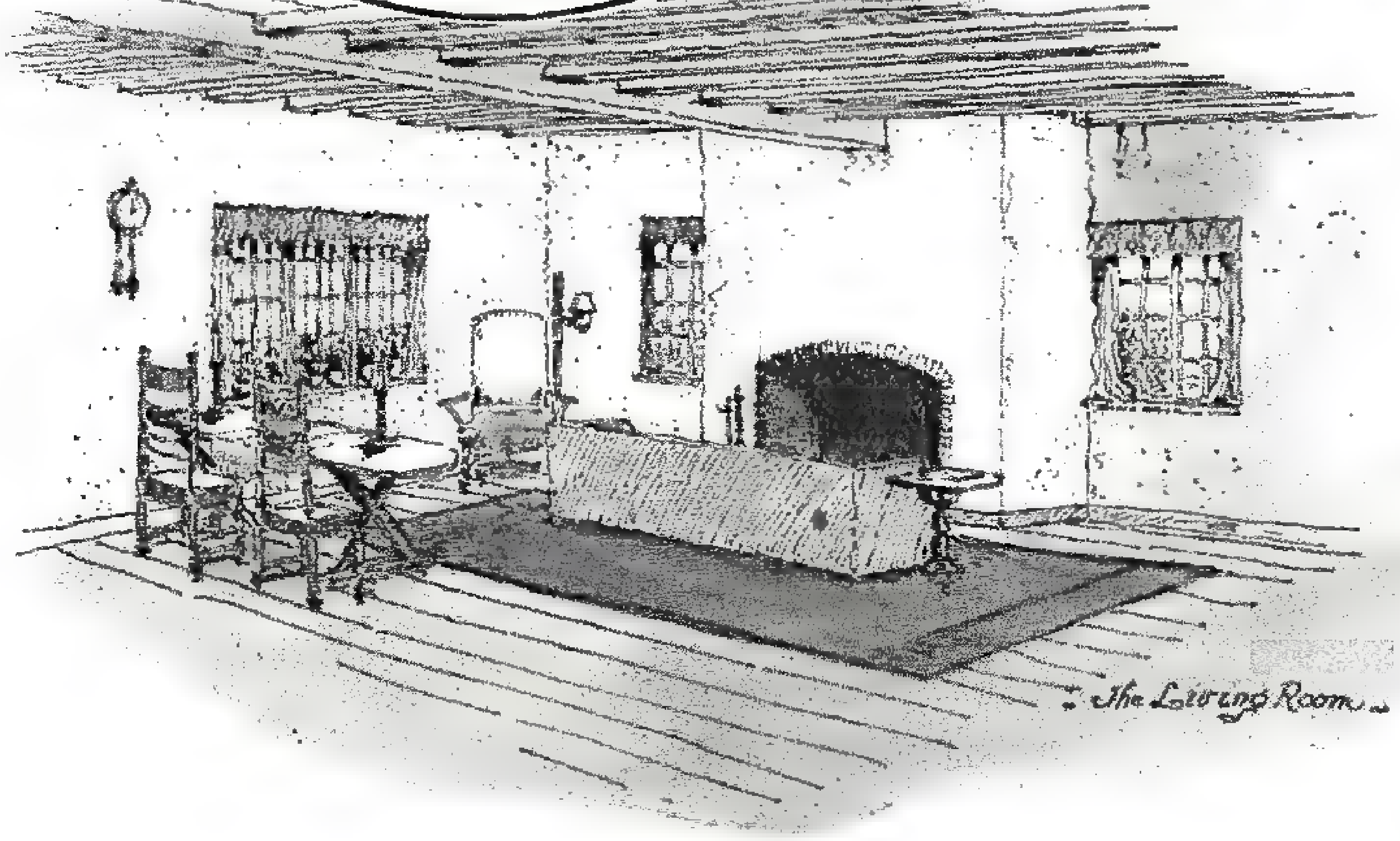
"Nothing to it," Bill airily replied. "We'll just ask to look at those fixtures within your price range, as many of them are much too expensive, and some are too elaborate for your purpose."

Gas ranges were next on the list. Here Tom and Jim were completely out of their element, their chief interest in kitchens being in the food that comes out of them. They left the selections entirely up to Mary and Helen, who each chose a four-burner gas range with ovens, broilers and regulators.

The next problem was paint and wallpaper. Bill suggested that they go to a wallpaper



Top left — Entrance to "Jim's house", a trim two-story white and brick home with a bright red door. Above — Architect supervises excavation of "Tom's home" at Leonia, N. J.



Living room of "Tom's home". It is costing $3,500 and "Tom" is building it with the help of a $2,870 loan, payable at $29 a month over a period of ten years—cheaper than rent.

house and select samples, which they could take home and decide definitely upon which they liked best. After all, he reminded them, the wrong wallpaper soon might prove distasteful, and they better be quite sure in their choice.

Tom and Mary decided on two very quaintly designed wallpapers for their bedrooms, and decided to paint the walls of the passage leading from the entry foyer past the bedrooms to the bathroom, a light green-blue shade with darker blue-green for the doors. For the living room Bill suggested an oyster gray, with just sufficient yellow in it to warm the gray a bit. This, he said, would give any curtains or draperies a good background by way of contrast. Tom and Mary liked the idea, and agreed that the entry hall should be similar to the living room.

"I don't suppose you'd approve of a green kitchen, would you, Bill?" asked Mary, timidly, a doubt and hope in her voice.

"Why not? An apple green on the wall would be swell! And what have you decided on the bathroom?"

"I'd like a blue that looks like the sea," said Mary quickly.

It was decided to stain the floors a dark rich brown after Tom and Bill convinced Mary that, contrary to all reasoning, dark floors look better and do not show the dirt half as much as light ones. They also decided to paint the outside doors a medium shade blue veering on green, and that while the trim around the windows should be the same color as the doors, the sash would be white. The blue, they thought would be a pleasant contrast to the white and stucco of their house.

Meanwhile, Bill was also giving the same careful attention to the last details of Jim's house. Jim and Helen had decided on a deep red for the front door, and light tan and brown for the sash and trim on all the windows to match the white and brick exterior. Helen chose an interesting block design wallpaper for the dining room and a gay paper for the entrance hall, which carried up the stair well and through the second hall.

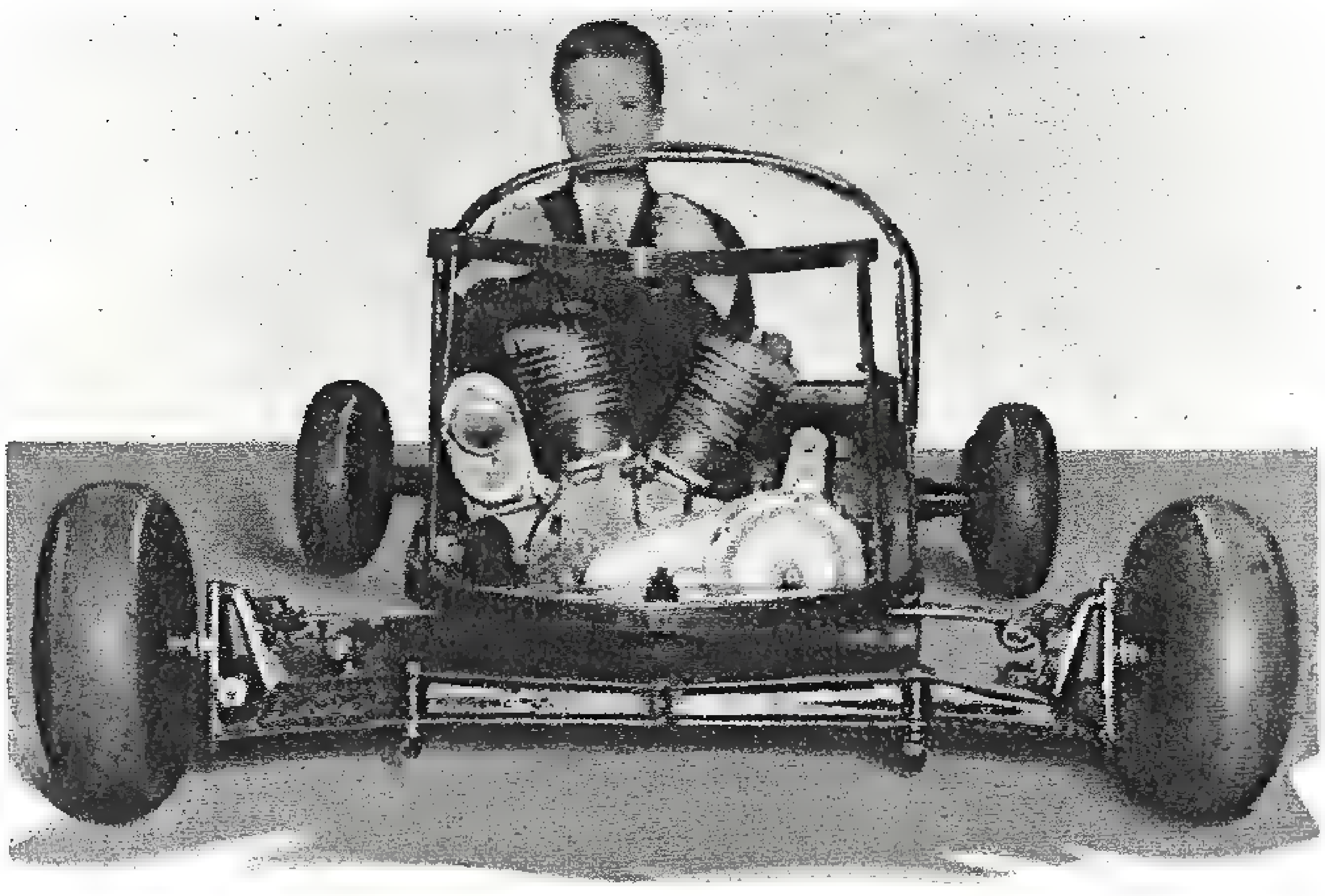
Both wives fairly lived on the job as the finishing touches were added to their homes. The day for moving from the city to the suburbs was quickly drawing near.

Educators Organize Future Craftsmen Of America

TO STIMULATE interest and enable boys and young men to acquire skill in workshop projects, a group of educational directors have organized the Future Craftsmen of America. The organization will establish local chapter workshops throughout the country in which members can undertake worthwhile craftsmanship projects.

Robert L. Cressman, Pennsylvania Department of Instruction, Earl L. Bedell, Detroit educator, and J. Lee Barrett, Detroit Convention and Tourist Bureau chairman, are the sponsors of the organization. It is hoped to establish chapters in every American high school.

To encourage members of the Future Craftsmen, William B. Stout, noted automobile engineer, announced that he would give a trophy to the boy who produces the most ingenious and useful piece of craftsmanship during the year. The organization will award degrees to members denoting progress and skill acquired.



Ralph E. Kleund exhibited this midget auto at Detroit, Mich., convention of Future Craftsmen of America. Costing $200 to build, a 15-horsepower motor enables car to travel 75 m.p.h.

Electric Vaporizer Devised

DEVELOPED to relieve the discomfort caused by nasal congestion and irritation, a new electric pocket vaporizer resembles a flashlight in construction. It consists of a specially designed metal case shaped like a fountain pen and uses two small batteries.

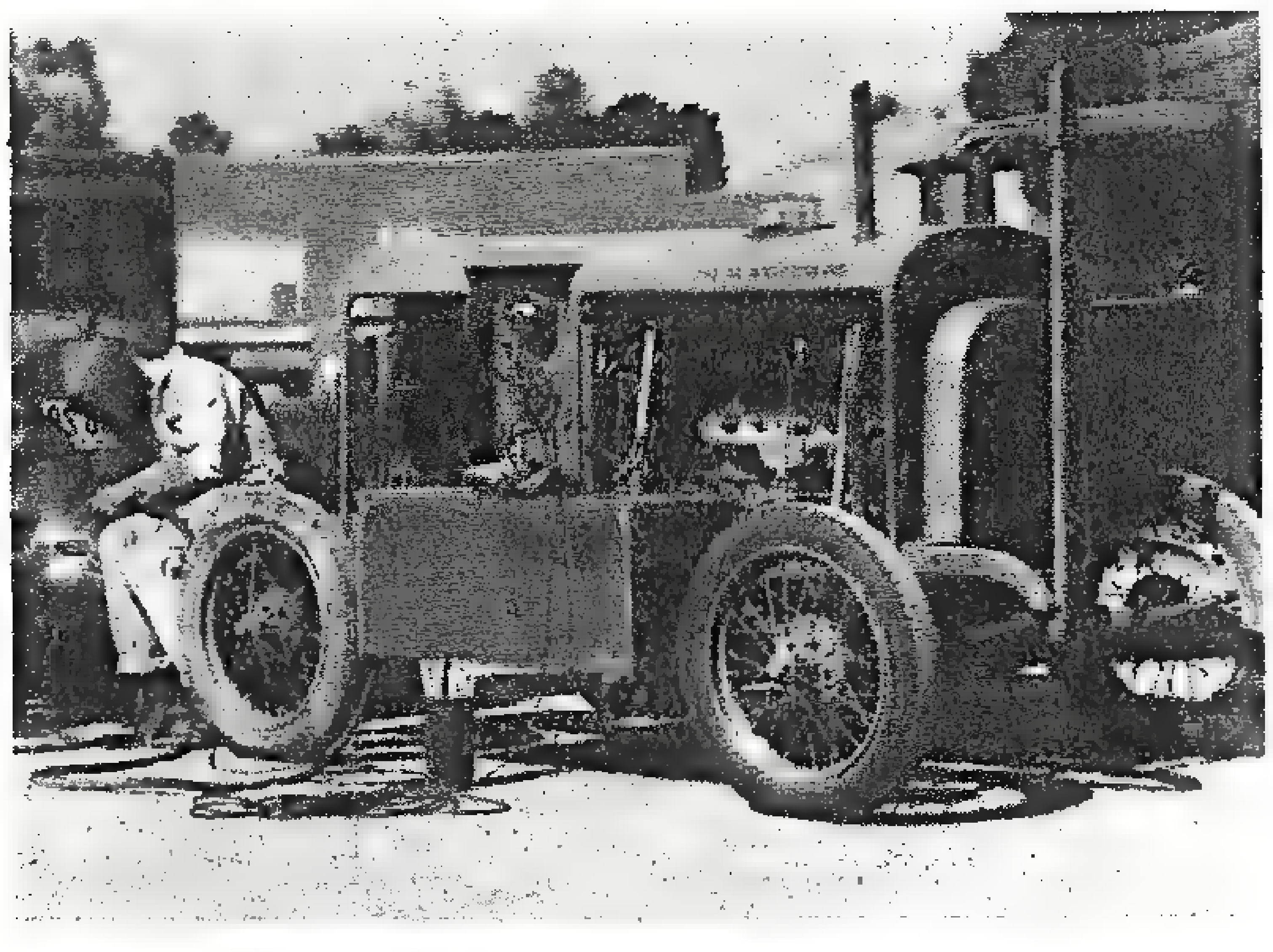
A patented bulb featuring a special filament as well as two depressed openings—one on top and the other on the side—is screwed into one end of the case. Vapor liquid is dropped into the side opening and is converted into vapor by a slight pressure on an electric switch button. The device was developed by a St. Louis, Mo., laboratory, which produces liquid.

Operated like a flashlight, this electric vaporizer is an aid in clearing away nasal congestions.

Builds Mobile Welding Unit

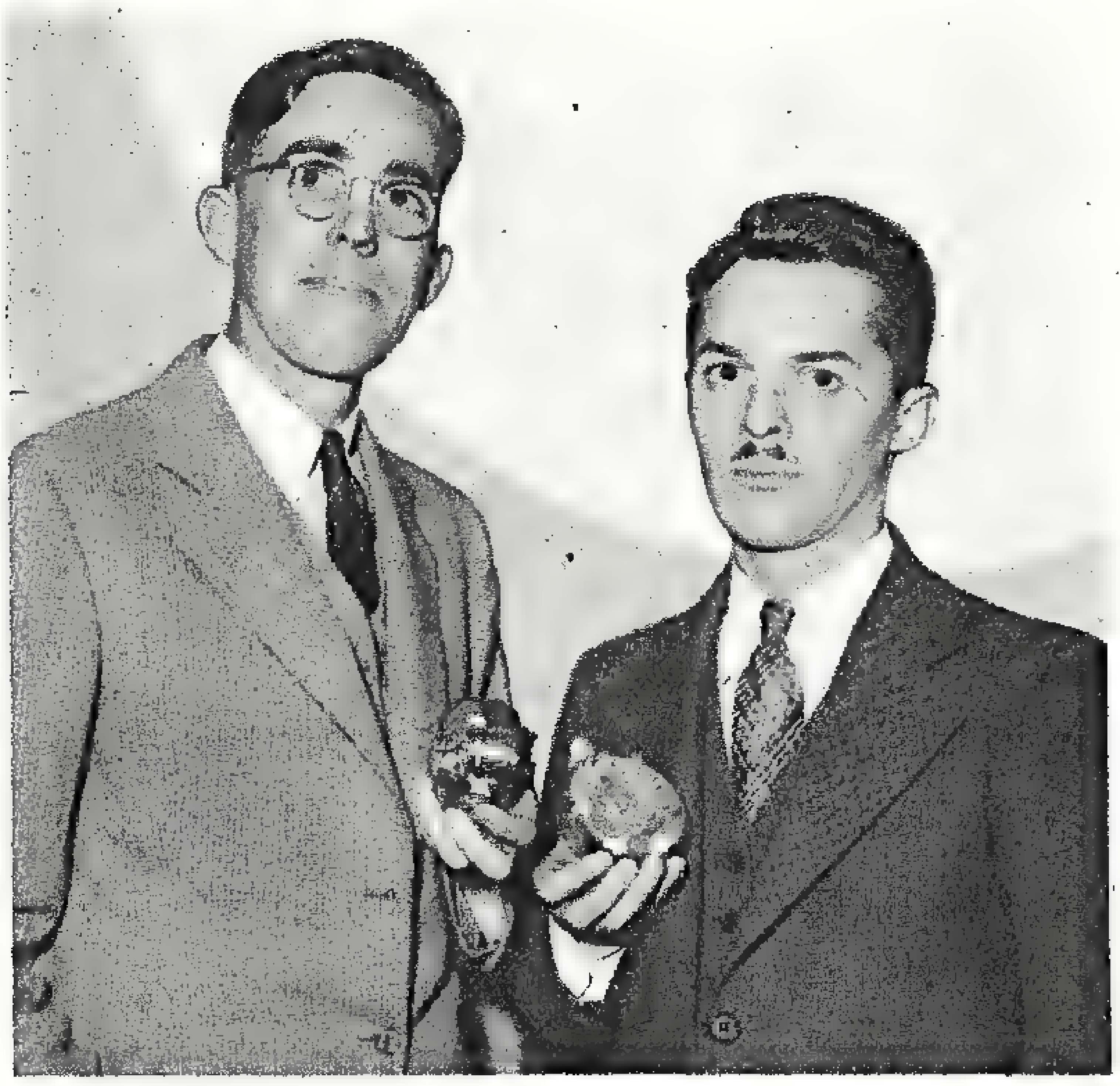
AN ELECTRIC welding outfit in the form of an auto trailer has been built by a garage operator in Alhambra, Calif., enabling him to undertake welding jobs in any part of the state. Under California laws no trailer license is needed as the machine is classified as a mobile piece of machinery.

The welding machine is mounted on an old Buick automobile chassis equipped with Ford axles and wheels. A Buick engine drives an electric truck starter motor rewound into a 300-ampere generator. The fields are excited by a re-built, 14-volt Dodge generator. Wiring, switchboards, and similar equipment were devised in the shop of D. D. Fowble, who built the welder, from salvaged used auto parts. Entire machine cost $600 to construct.



Made from salvaged auto parts this mobile electric welder was built by D. D. Fowble, an Alhambra, Calif., garage operator. It extends his working range to include entire state.

New Vacuum Tube May Aid Television Progress



Arthur L. Samuel (left) and Joseph P. Laico of the Bell Telephone Laboratories compare their newly developed television vacuum tube, held by Samuel, with old type television tube.

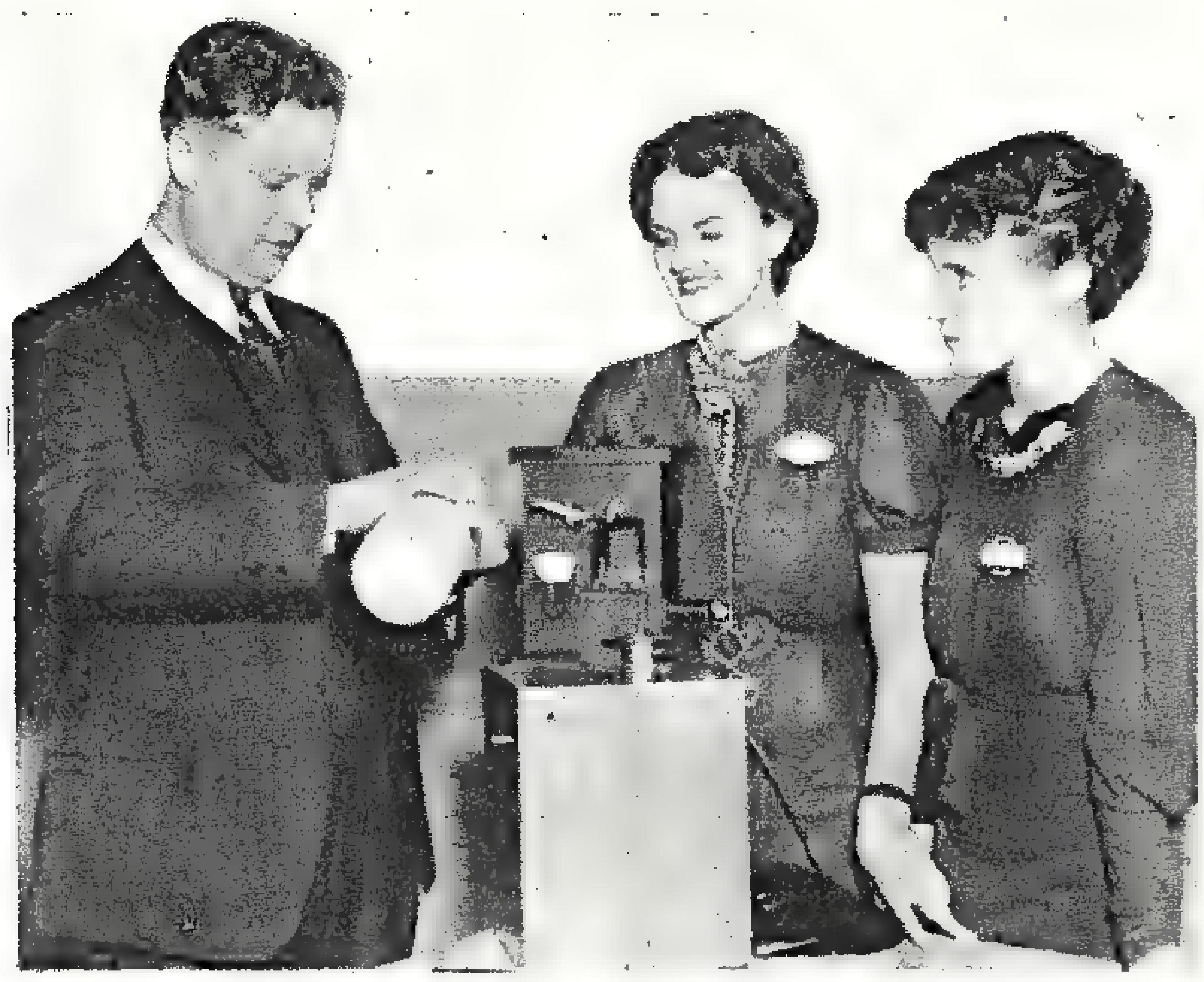
A NEW vacuum tube of novel construction which may be an important aid in the development of television has been undergoing tests at the Bell Telephone Laboratories in New York City. The tube was developed as the result of collaboration by Joseph P. Laico and Arthur L. Samuel.

The new tube is more compact than the old type formerly used in television experiments. It consists of two small tubes built inside of a glass bulb which is about three inches in diameter and only two inches long. It generates ten watts of radio power at a wave length of about one meter.

Electric Eye Grades Milk

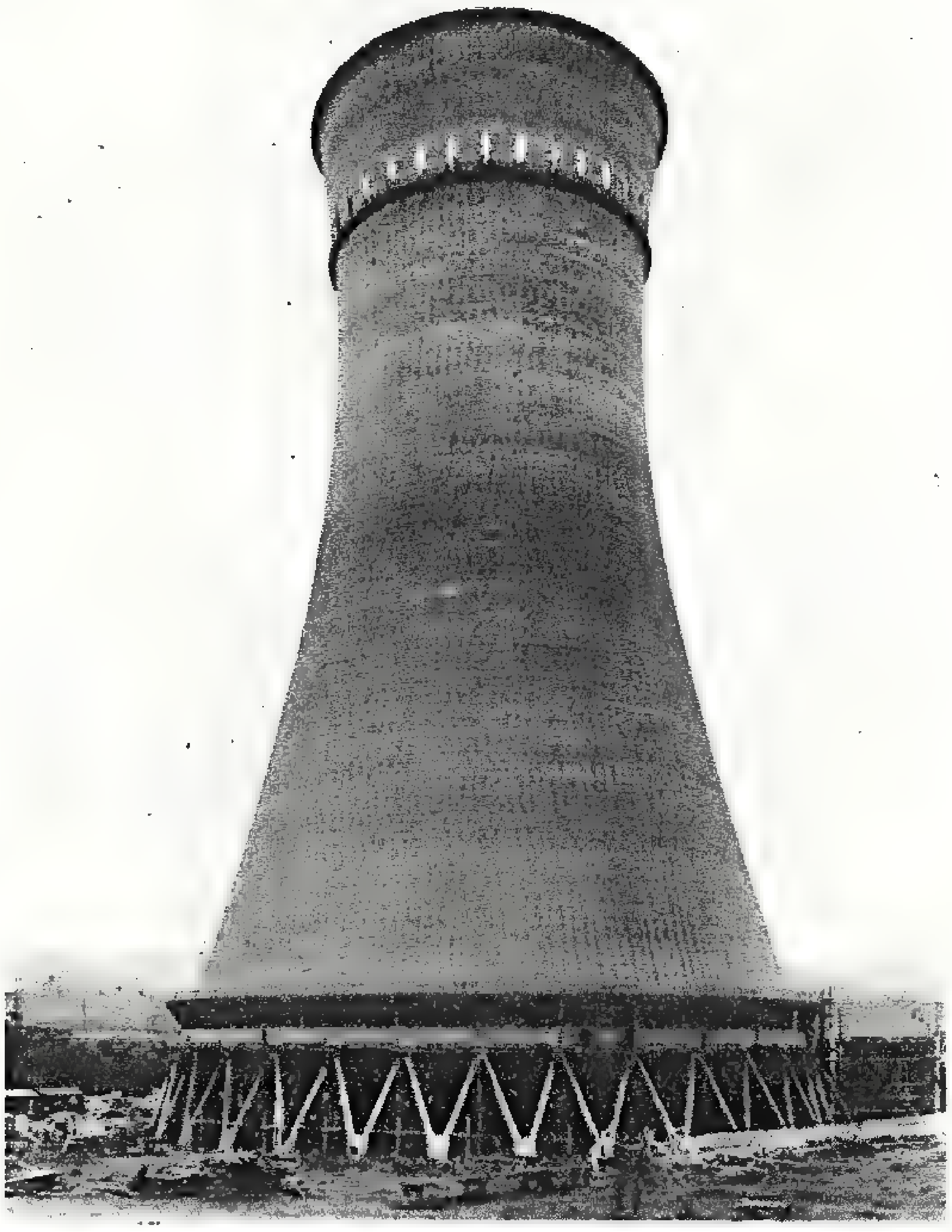
AN ELECTRIC eye machine that grades milk according to color was demonstrated at the research laboratory of the New Jersey Agricultural Experiment Station at Rutgers University, New Brunswick, N. J. The device was developed by W. R. Manwaring of Wyckoff, N. J.

The machine measures the capacity of any milk to transmit light, grading it accordingly. It is expected to aid dairymen by creating a breeding policy of milk color selection as heritable traits in herds of registered lineage.



H. H. Tucker, professor of dairy husbandry at Rutgers University, tests an electric eye machine that grades milk according to color. Eleanor Greene and Helen Kindwall look on.

Erect Huge Cooling Tower



Standing 250 feet high, this tower cools 3,000,000 gallons of water per hour for an English power company. Fred Mitchell & Sons, Manchester engineers, built it in ten months.

BELIEVED to be the largest in the world, a reinforced concrete water cooling tower has been erected for the Lancashire Electric Power Co., in Kearsley, England. The tower is 250 feet high and has a maximum diameter of 175 feet. It is capable of cooling three million gallons of water per hour.

The complete tower weighs about 5,000 tons and its construction required the services of 90 men for a period of ten months.

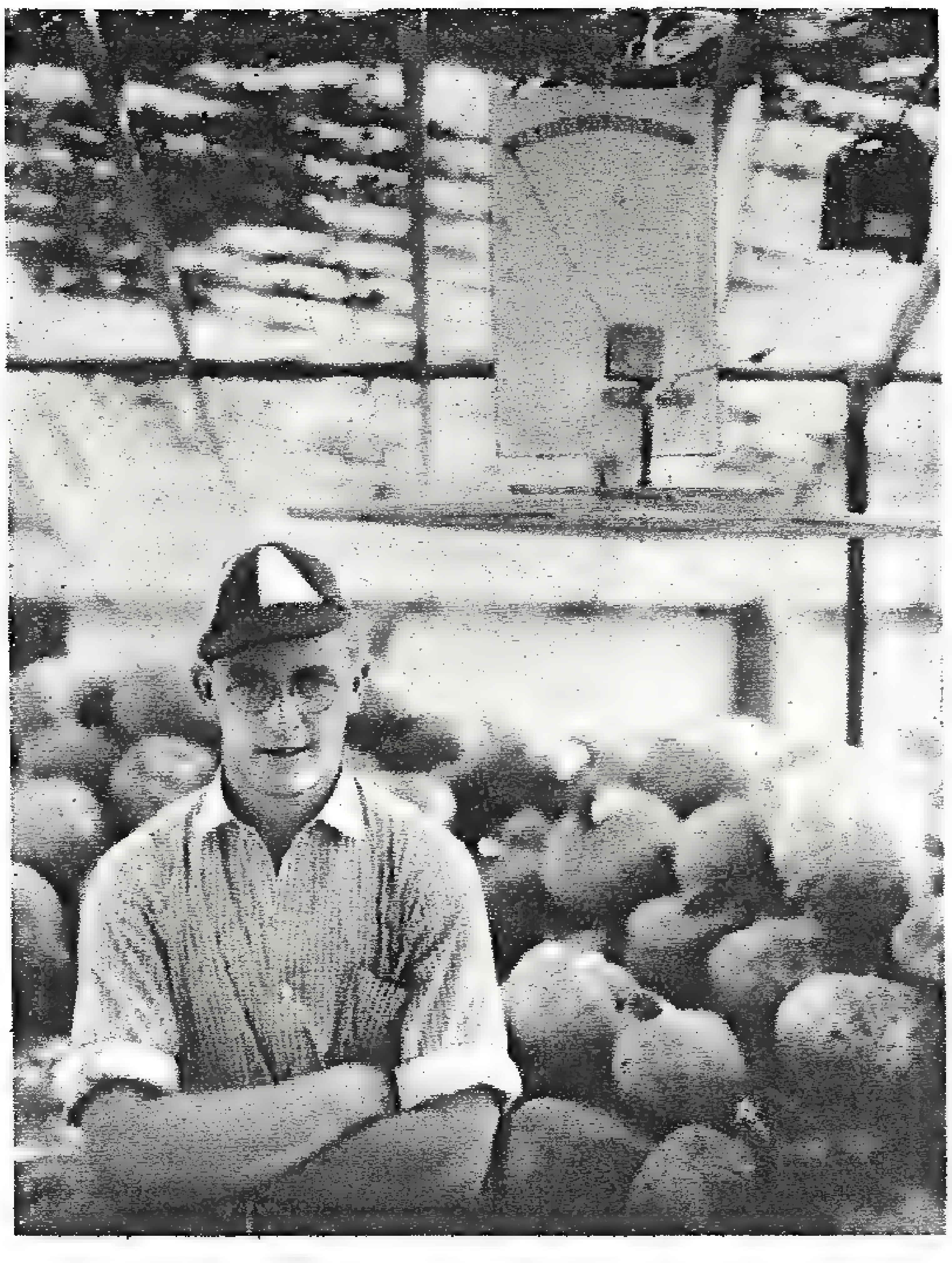
Colonel Lindbergh Flies New English Monoplane

FOR fast flying trips around England, where he is now residing, Colonel Charles A. Lindbergh has acquired a Miles "Mohawk" airplane, said to be the fastest touring monoplane in the country. The streamlined plane is capable of a speed of 200 m. p. h.

The airplane was especially designed for the famous American pilot by F. G. Miles, noted English aeronautical engineer. It is powered with a 200-horsepower Menasco engine of American manufacture. Colonel Lindbergh ordered the plane finished in orange and black colors.

Top—Colonel Lindbergh tests his new Mohawk monoplane at Reading, England. It travels 200 m.p.h. Lower—Famous pilot explains the American built engine to English friends.

Ingenuity Wins Scholarship



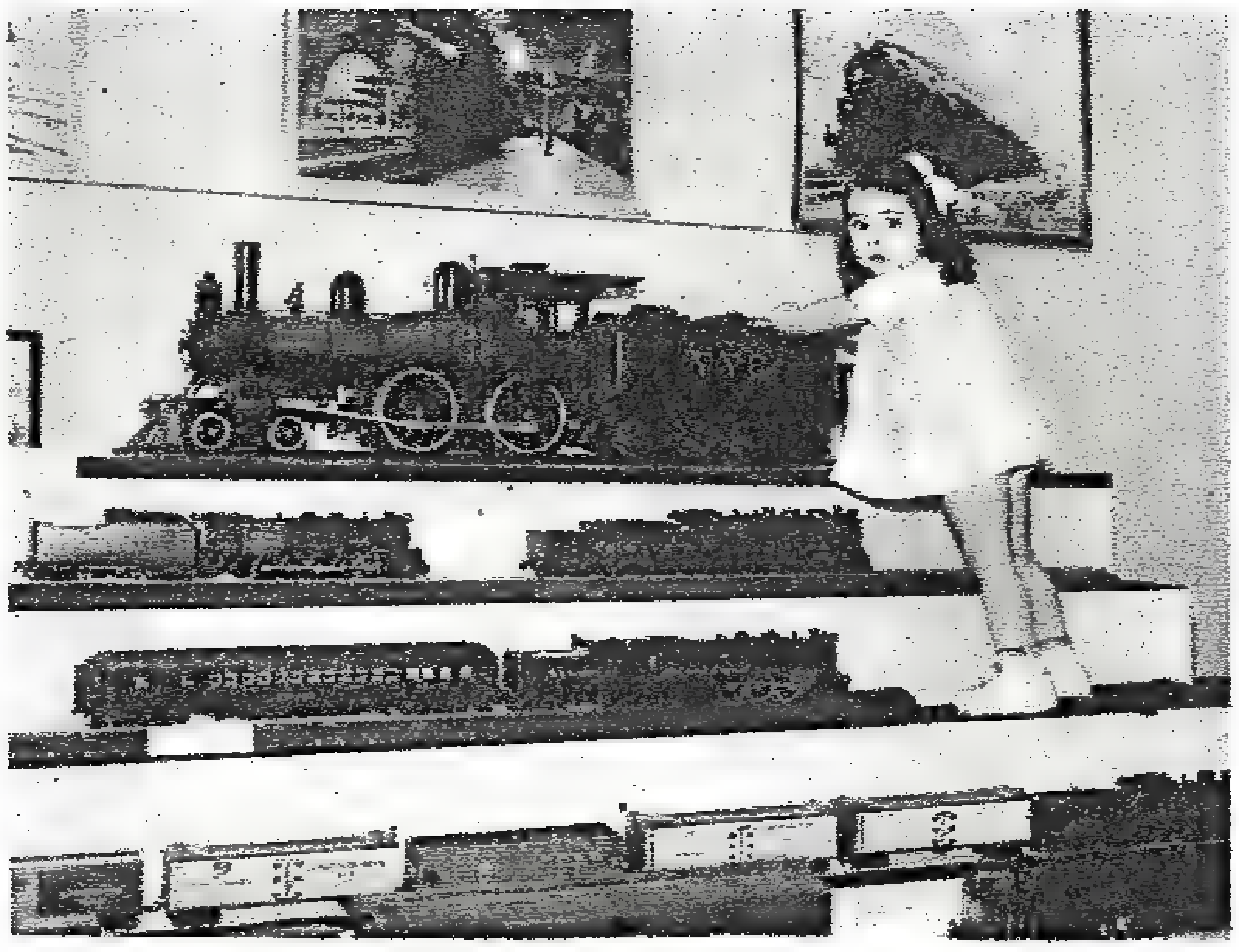
From junk scraps, Franklin D. Hayes, of Worcester, Mass., ingeniously constructed a greenhouse temperature control regulator device that won a $500 college scholarship for him.

USING scrap materials totaling about two dollars in value, Franklin D. Hayes, of Worcester, Mass., created a device that won a $500 Yankee Ingenuity Scholarship at Worcester Polytechnic Institute.

The device automatically turns on a greenhouse heating plant whenever temperature drops more than three degrees. The apparatus is actuated by the expansion and contraction of cleverly arranged zinc strips.

Exhibit 450 Train Models

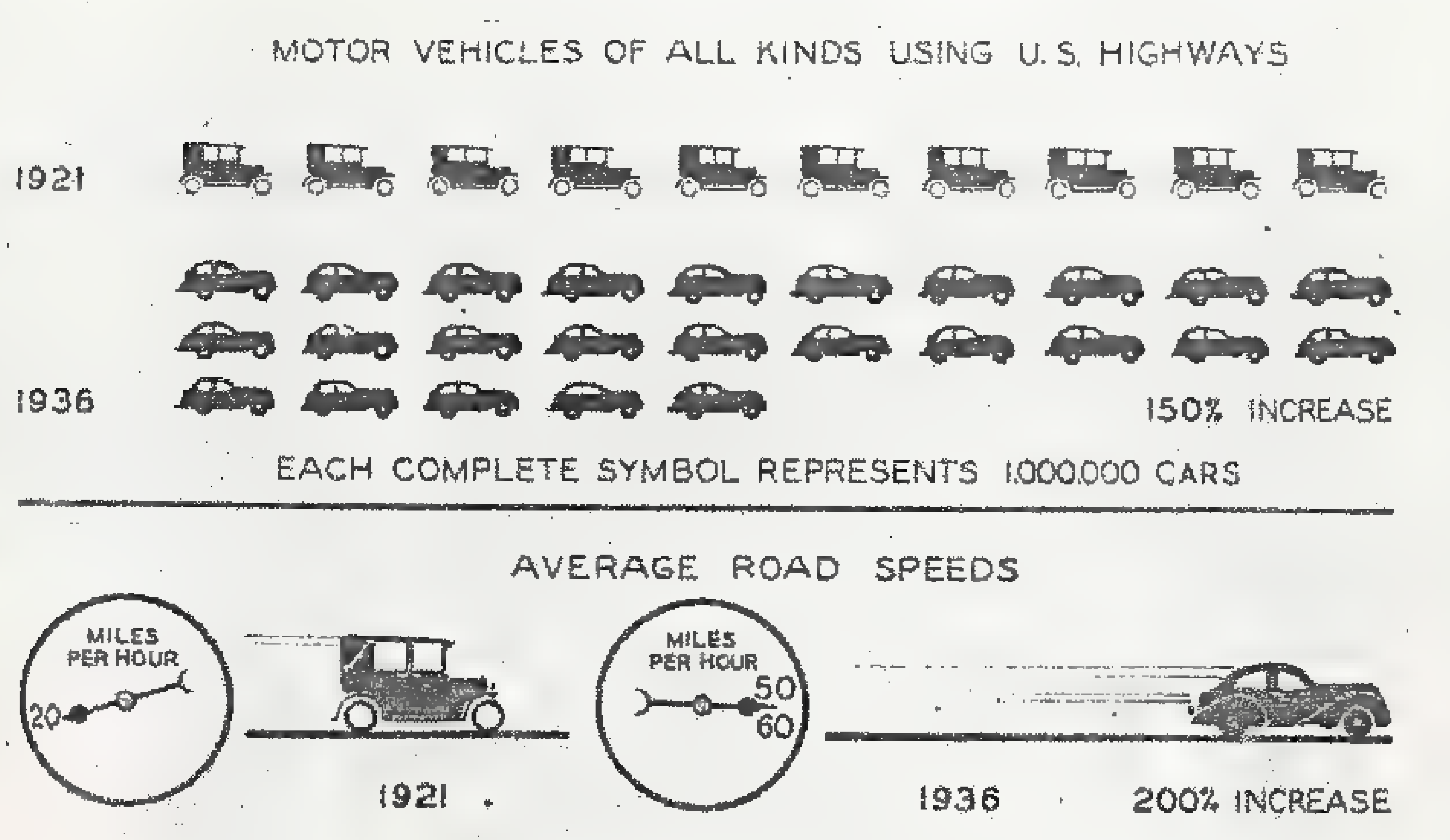
MORE than 450 models of engines, track sites, freight and passenger cars, depots, bridges, etc., were displayed at the first annual convention of the National Model Railway Association held in Los Angeles. Models ranged in size from the popular small size types to a locomotive that measured over four feet long and one and a half feet high. Over five hundred regional members attended the convention.



Train models of every size and description were displayed at first annual National Model Railway Association convention in Los Angeles. Merilyn Denton climbs after biggest model.

Uncorking Bottled

by Dr. Miller McClintock
Director, Bureau for Street Traffic Research, Harvard University.



HOW AND WHY TRAFFIC HAZARDS HAVE INCREASED IN PAST 15 YEARS

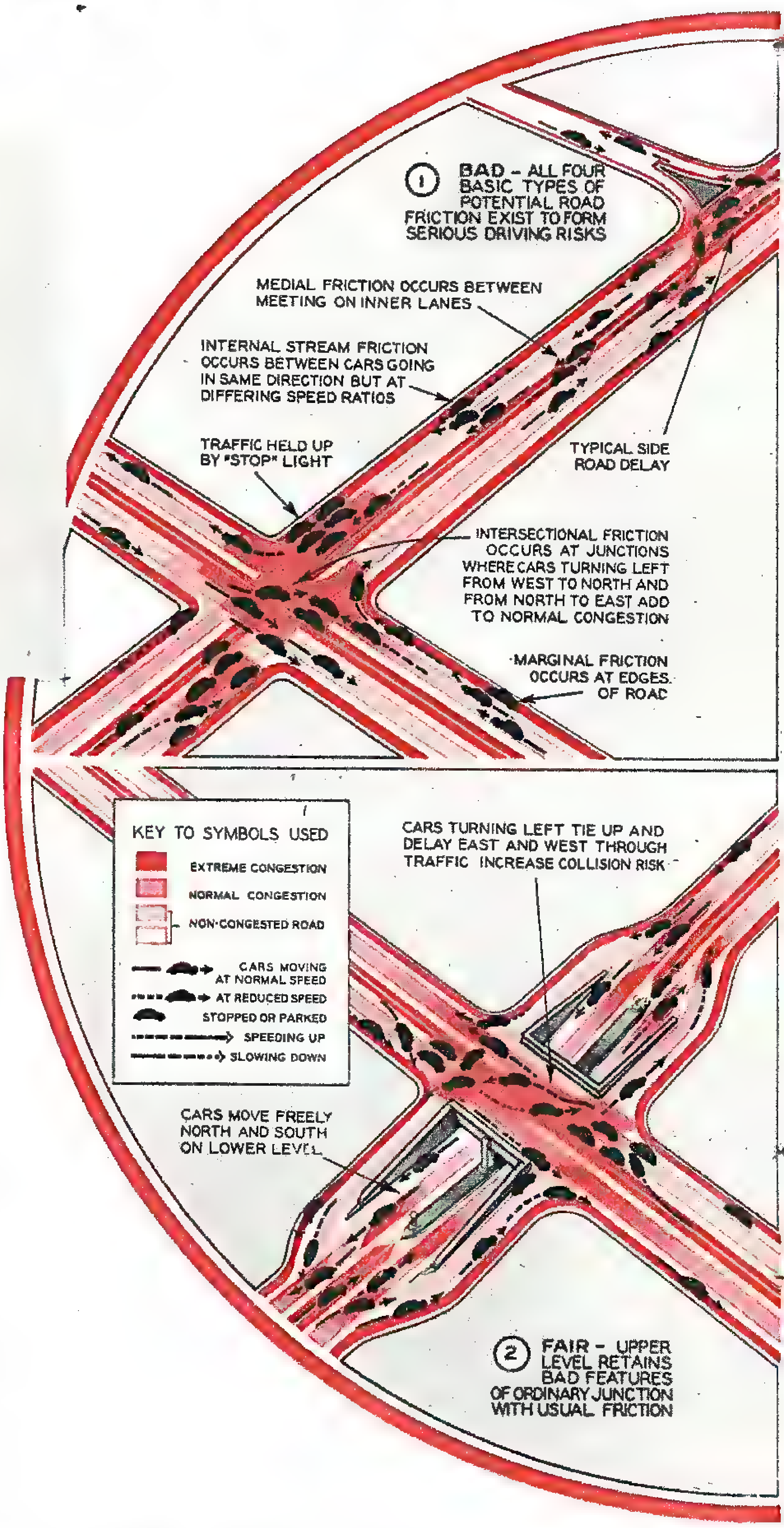
AN IDEA of the problem confronting the traffic engineer may be gained by keeping in mind two contrasting pictures:

Fifteen years ago there were, roughly, 10,000,000 motor vehicles in this country. Today there are two and a half times that number.

Fifteen years ago, and even ten years ago, speed on the road averaged 20 miles an hour. Gradually it went up to 30, then 40, until today speeds of 50 to 60 miles an hour and beyond are considered normal on the open road.

Thus, we have two parallel facts: In the past 15 years the automobile population has increased by 150 per cent, and the rate at which that wheeled population moves along the highways has jumped from 150 to 200 per cent.

As the volume of traffic grew the channels through which it flowed also grew. But they did not grow in a uniform manner, nor as rapidly as the automobile was growing in its speed capabilities. Not that admirable work was not done to have the highway, inherently static, keep pace, as it were, with the faster-developing automobile; the automobile could not have grown in numbers and speed if highways had not developed beyond the horse and buggy stage. But it took money and time to lay the highway network of the United States, by far the most extensive in the world. It has taken even more money and time, once

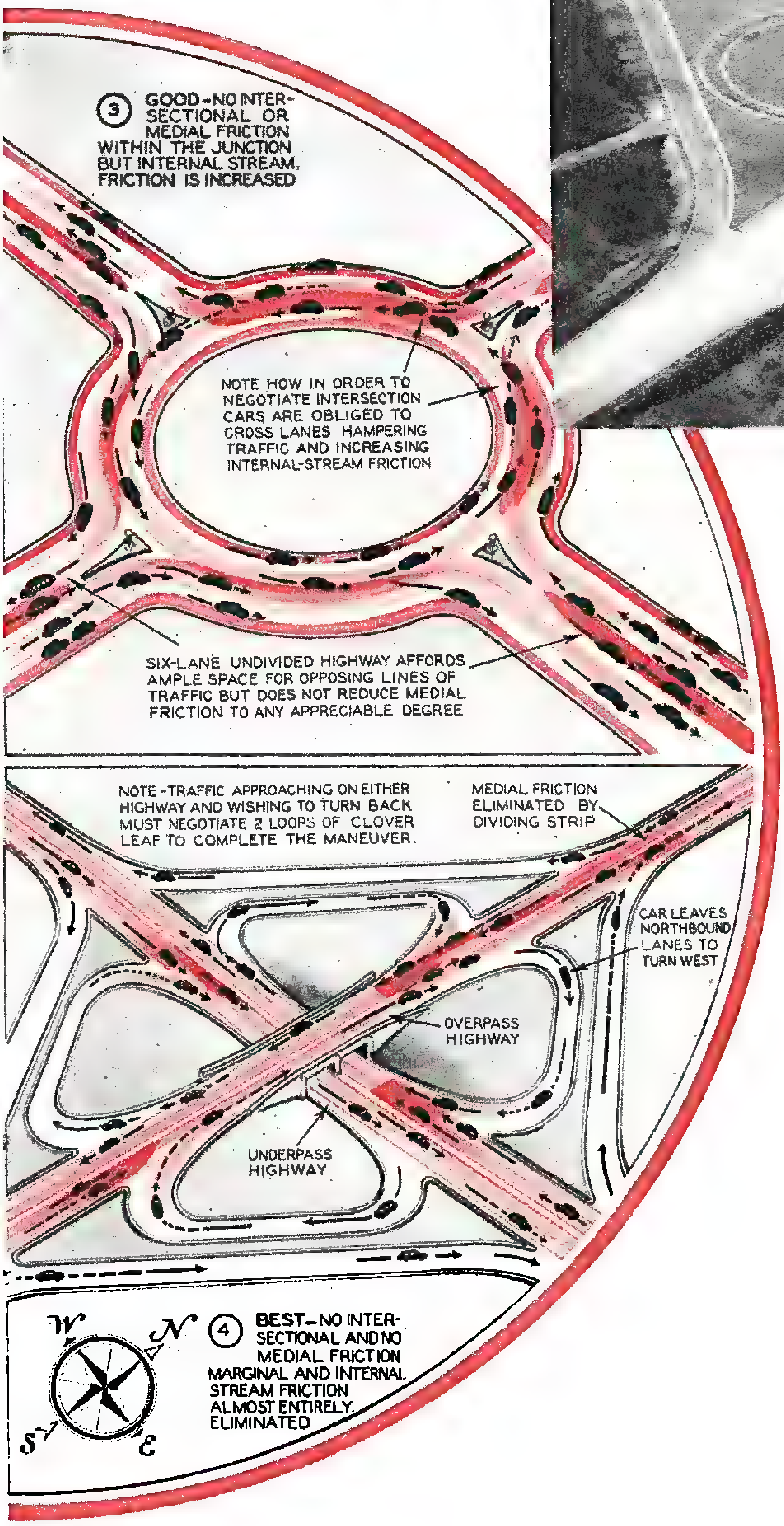

① BAD - ALL FOUR BASIC TYPES OF POTENTIAL ROAD FRICTION EXIST TO FORM SERIOUS DRIVING RISKS
MEDIAL FRICTION OCCURS BETWEEN MEETING ON INNER LANES
INTERNAL STREAM FRICTION OCCURS BETWEEN CARS GOING IN SAME DIRECTION BUT AT DIFFERING SPEED RATIOS
TRAFFIC HELD UP BY "STOP" LIGHT
TYPICAL SIDE ROAD DELAY
INTERSECTIONAL FRICTION OCCURS AT JUNCTIONS WHERE CARS TURNING LEFT FROM WEST TO NORTH AND FROM NORTH TO EAST ADD TO NORMAL CONGESTION
MARGINAL FRICTION OCCURS AT EDGES OF ROAD
KEY TO SYMBOLS USED
EXTREME CONGESTION
NORMAL CONGESTION
NON-CONGESTED ROAD
CARS MOVING AT NORMAL SPEED
AT REDUCED SPEED
STOPPED OR PARKED
SPEEDING UP
SLOWING DOWN
CARS TURNING LEFT TIE UP AND DELAY EAST AND WEST THROUGH TRAFFIC INCREASE COLLISION RISK
CARS MOVE FREELY NORTH AND SOUTH ON LOWER LEVEL
② FAIR - UPPER LEVEL RETAINS BAD FEATURES OF ORDINARY JUNCTION WITH USUAL FRICTION

MARGINAL FRICTION involves contact with a person or object on the edge of the road. It leads to such accidents as striking a pedestrian, telegraph pole or parked car, or running into the ditch.

INTERNAL-STREAM FRICTION involves contact between cars moving over a multiple-lane highway in the same direction but at different speeds. It leads to such accidents as side-swiping a car in passing.

Top left quarter of diagram shows traffic at its worst. Lower quarter shows a fair solution, with through traffic on lower road, but dangerous disadvantages of ordinary junction on upper levels.

Traffic


③ GOOD-NO INTERSECTIONAL OR MEDIAL FRICTION WITHIN THE JUNCTION BUT INTERNAL STREAM FRICTION IS INCREASED
NOTE HOW IN ORDER TO NEGOTIATE INTERSECTION CARS ARE OBLIGED TO CROSS LANES HAMPERING TRAFFIC AND INCREASING INTERNAL-STREAM FRICTION
SIX-LANE UNDIVIDED HIGHWAY AFFORDS AMPLE SPACE FOR OPPOSING LINES OF TRAFFIC BUT DOES NOT REDUCE MEDIAL FRICTION TO ANY APPRECIABLE DEGREE
NOTE-TRAFFIC APPROACHING ON EITHER HIGHWAY AND WISHING TO TURN BACK MUST NEGOTIATE 2 LOOPS OF CLOVER LEAF TO COMPLETE THE MANEUVER.
MEDIAL FRICTION ELIMINATED BY DIVIDING STRIP
CAR LEAVES NORTHBOUND LANES TO TURN WEST
OVERPASS HIGHWAY
UNDERPASS HIGHWAY
W
N
S
E
④ BEST-NO INTERSECTIONAL AND NO MEDIAL FRICTION. MARGINAL AND INTERNAL STREAM FRICTION ALMOST ENTIRELY ELIMINATED

A "Cloverleaf" type highway at Paranus, N. J., keeps up with automobile age. With super roadways crossing, safety is assured by this Limited Way.

the basic network was finished, to improve the highways to the point where they can accommodate and expedite modern traffic.

While the automobile was being improved, the better to serve as a means of transportation, and the highways were being extended and redesigned, the better to fit the modern car, two things were happening.

The first, of tragic importance, is that more and more persons were meeting death and injury on the highway. In 1913 all deaths by motor vehicles totaled only 4,200. Five years later the number had multiplied by two and one-half times. Nearly 40,000, more than three and one-half times the 1918 figure, were killed last year. In addition, 105,000 others were crippled permanently and more than 1,000,000 injured.

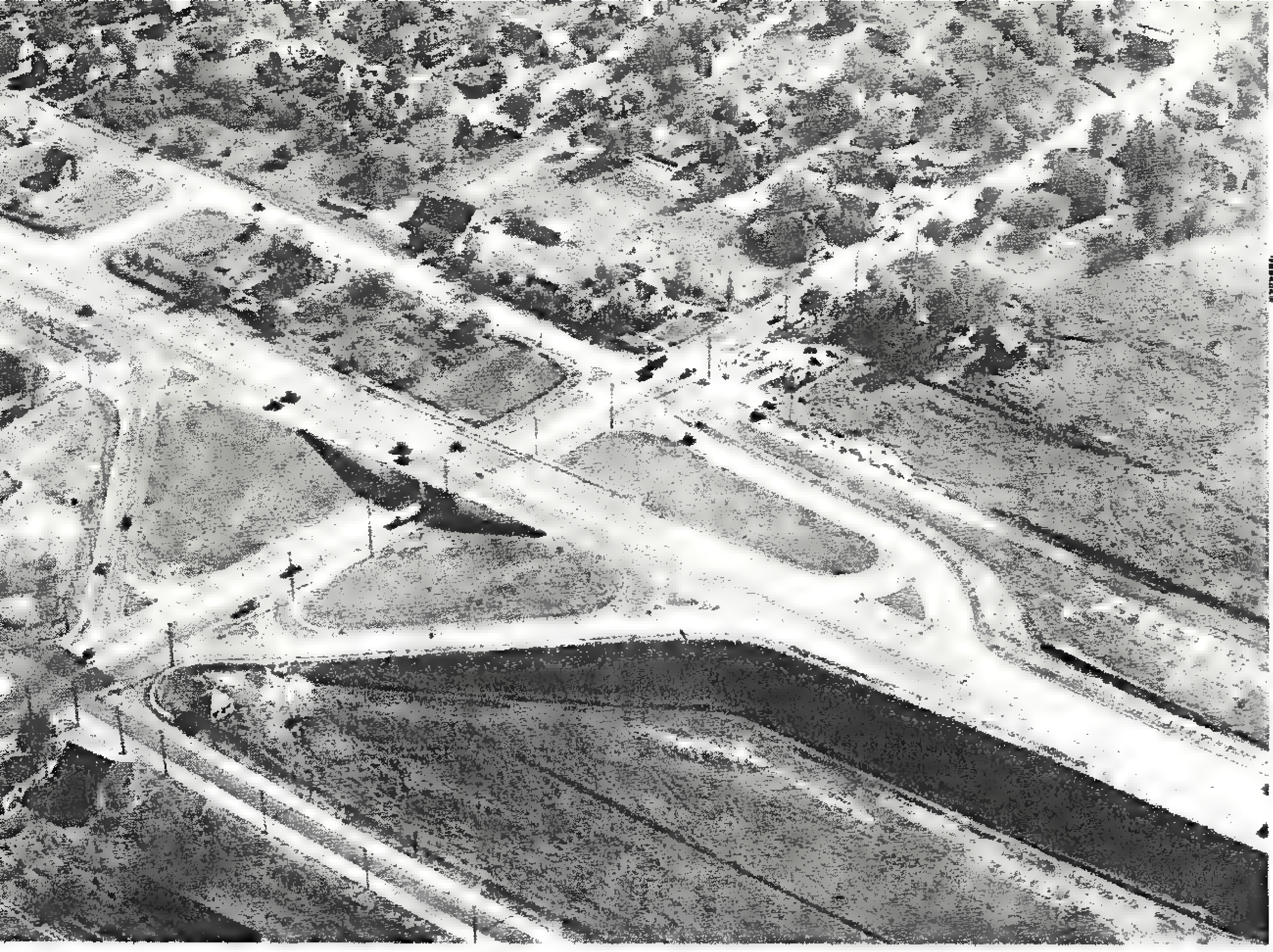
The second was the growing congestion of traffic, particularly in large cities. Congestion impairs the use of the automobile, defeating the very purpose of rapid and free motion for which it was built; it also costs enormously. In New York City alone it has been estimated that delays due to traffic congestion cost motor vehicle owners $1,000,000 *a day*. While dire prophesies of a saturation point for automobiles are no more to be taken seriously today than when we had one-third the number of cars (when such prophesies were most loudly uttered), they point to the need for correction. A man will not want to buy an automobile if he cannot make use of it without undue inconvenience and undue risk.

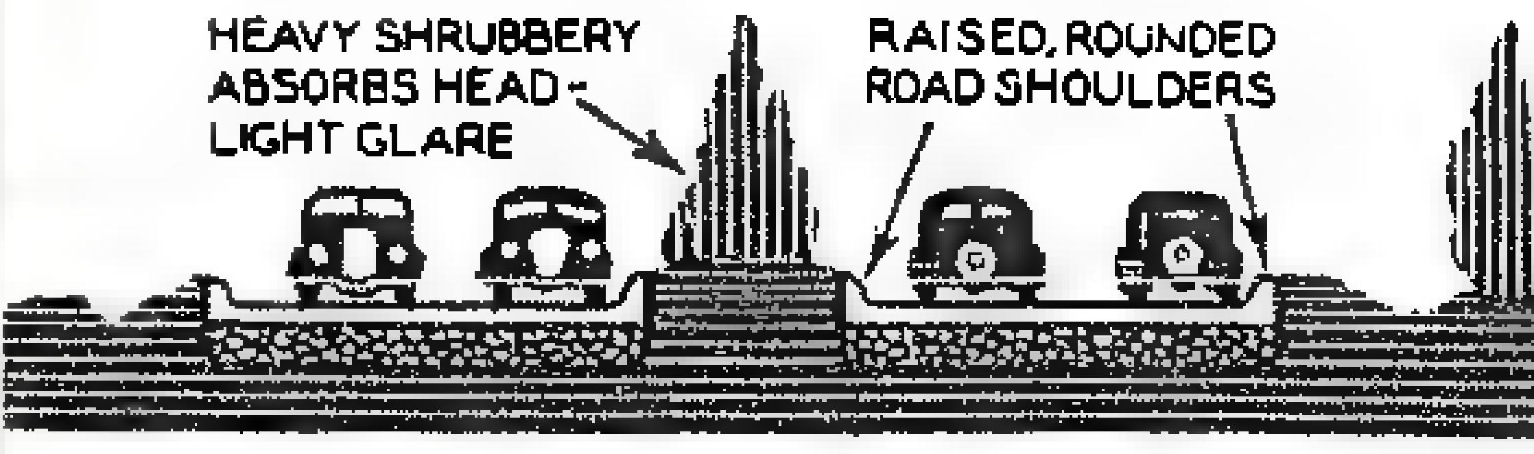
For years everyone has referred to "the stream of traffic"—an inspired popular antici-

Though theoretically traffic flow never ceases in rotary junction (upper right) there is still danger and delay. Cloverleaf juncture of two roads with median strips (lower right) is traffic at its best. There is no congestion, little delay.

MEDIAL FRICTION involves a contact in the middle of the road, as when two cars from opposite directions crash head-on.

INTERSECTIONAL FRICTION involves contact at intersections where streams from different directions come together in the center, forming dams and eddies of traffic. It leads to such accidents as ramming a car in the side and, in addition, to much confusion and delay.




HEAVY SHRUBBERY ABSORBS HEAD-LIGHT GLARE
RAISED, ROUNDED ROAD SHOULDERS

SECTION THRU TYPICAL LIMITED HIGHWAY ILLUSTRATING ITS SAFETY FEATURE

Traffic intersection near Englewood, N. J., which provides through traffic on both upper and lower highways (left).

●

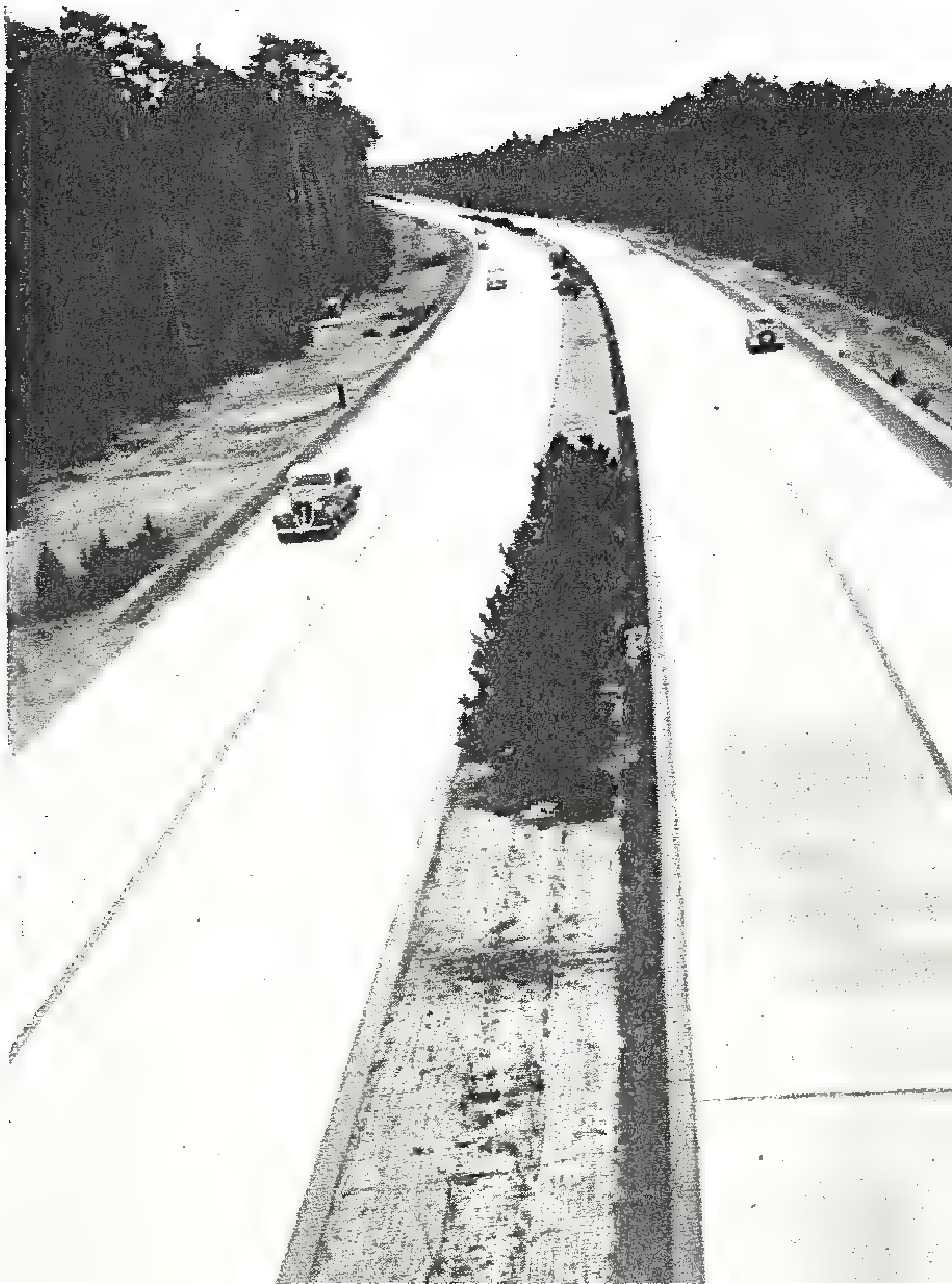
Below: Germany's magnificent new speedway, between Frankfort-on-Main and Darmstadt. Note newly planted foliage in center to absorb glaring lights.

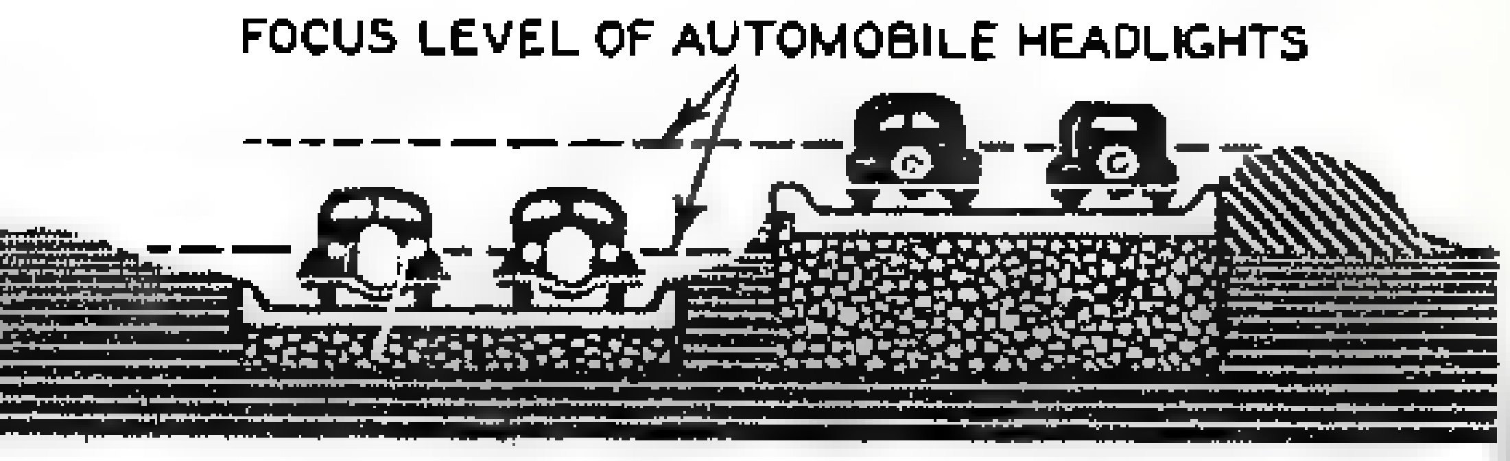
pation of what the traffic engineer has come to consider the basic concept of the traffic situation. Traffic moving over a highway has many of the characteristics of water flowing over a river bed, and it obeys similar principles of hydraulics. In other words, as traffic speeds along, turning and twisting and stopping and starting, it encounters four types of friction, as outlined on pages 42 and 43. Analysis of thousands of accidents and near-accidents, and of the elements that create confusion and delay on the road, has shown that all of these traffic hazards and inconveniences fall into one or another of these four kinds of friction.

With these principles in mind, the traffic engineer today not only can diagnose but prescribe for every traffic ill. The Limited Way is the application of these principles. It is a highway designed to move the greatest volume of traffic rapidly and safely.

The Limited Way eliminates medial friction by a raised strip down the center that keeps opposing streams of cars entirely separate. This division of the streams reduces inter-stream friction, since a driver can take his time about passing a car without fear of being struck by an on-coming car. Again, the Limited Way reduces marginal friction by having the edges rounded and raised, so that there is little danger of going off the road; and by a barrier which prevents cars from a side road from cutting into the main stream except gradually. Cars enter the side road from the Limited Way by first going into a deceleration lane at the right.

And, lastly, the Limited Way minimizes intersectional friction by making use of the clover leaf. The clover leaf represents an evolution similar to that of the straightaway. As traffic volume and the speed of automobiles grew, it became apparent that the simple junction, with the four streams of traffic—two on each road—cutting across one another on the same level did little to prevent confusion, handmaiden of accidents. The cars stopped by the red signal jam together; cars turning left on the green light block the passage of those trying to move with the signal, while





SECTION THRU NEW GERMAN LIMITED WAY WITH STAGGERED TRAFFIC LANES

An American two-way highway, winding over hill and dale, speeds traffic in rural areas on smooth ribbons of concrete.

●

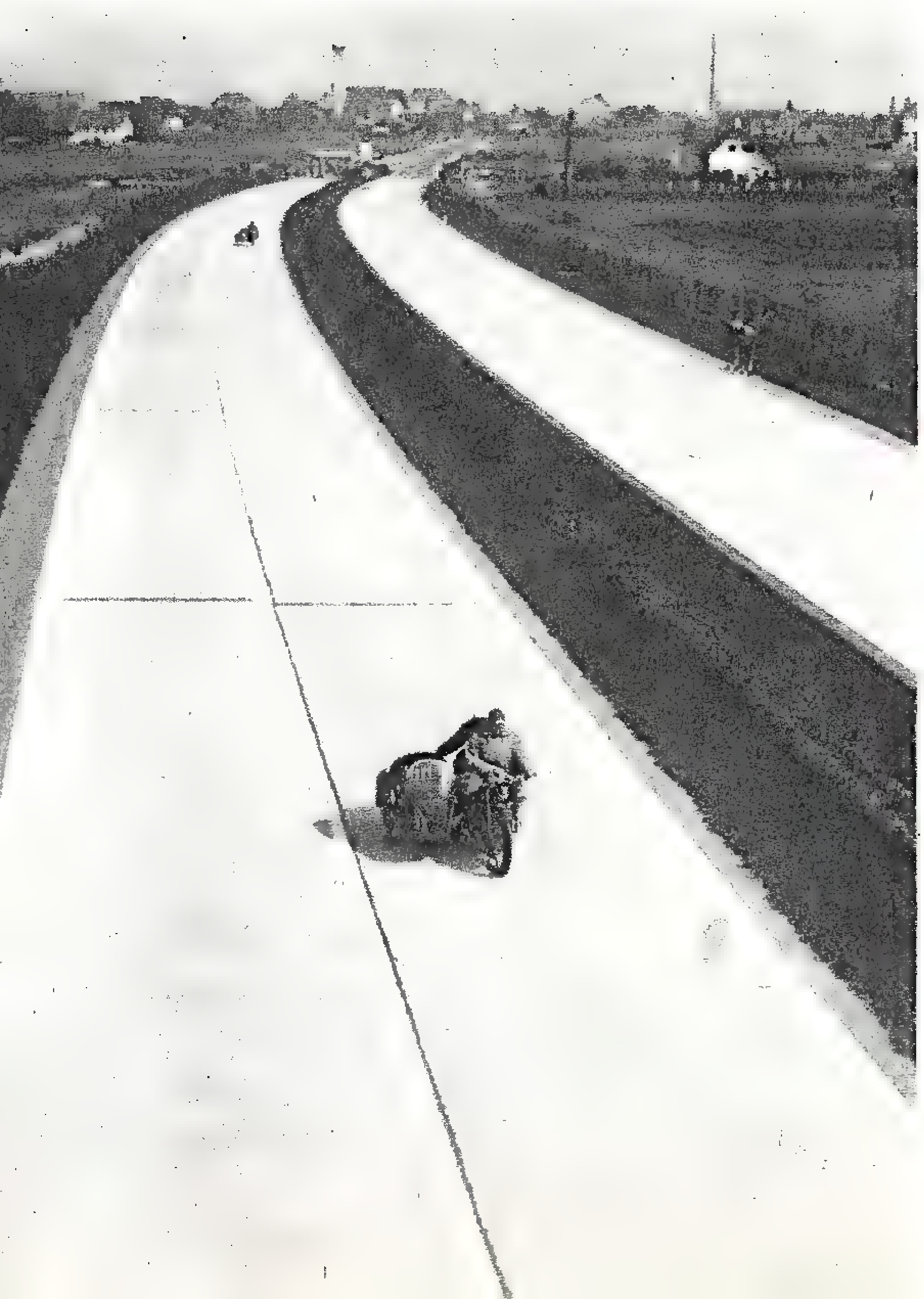
Staggered traffic lanes on Germany's Reichsautobahnen between Munich and Holzkirchen. Diagram at lower right shows how blinding lights of passing cars are diffused.

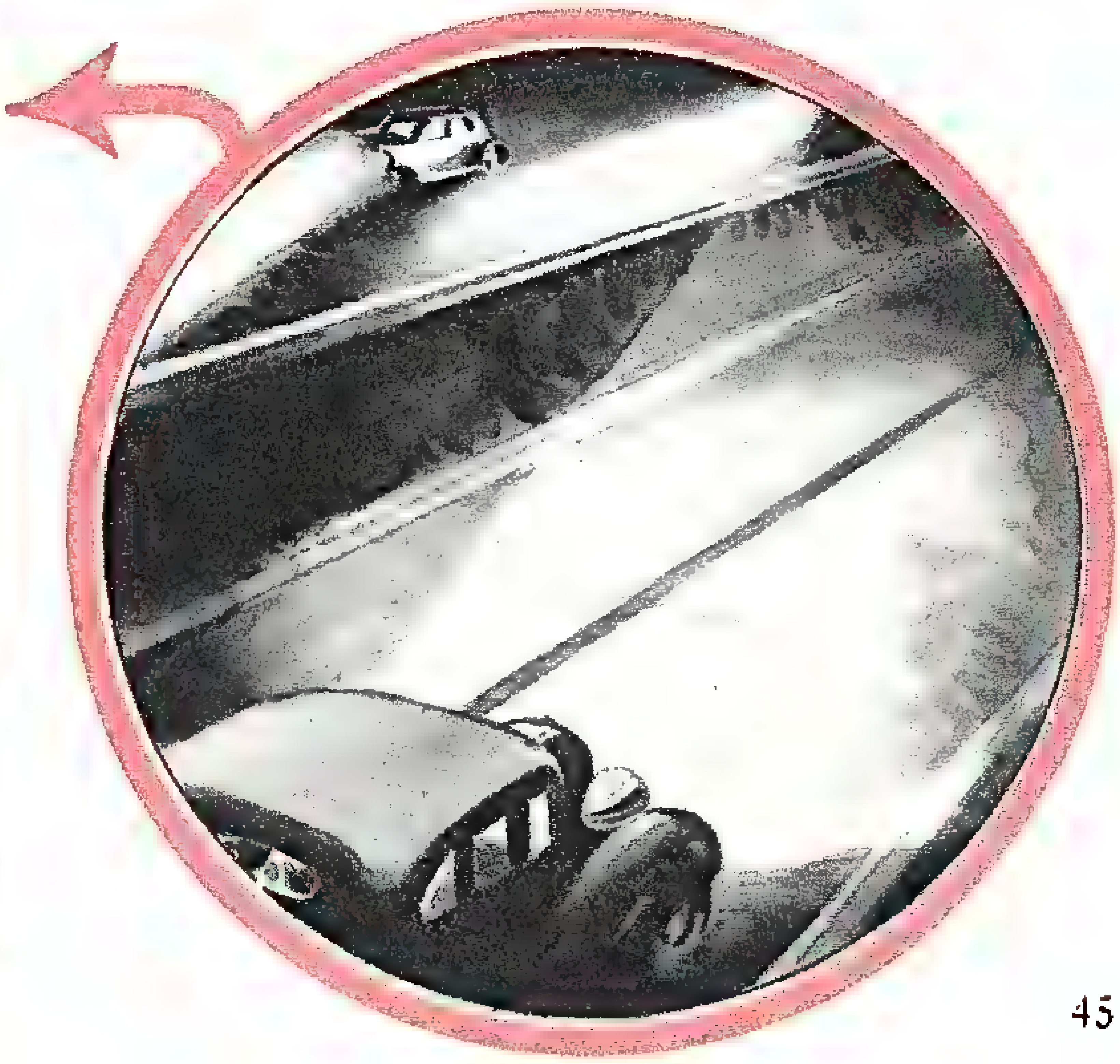
both the left turning cars and the right turning cars crowd together, jockeying to get through. The result is often a ram amidships.

By depressing one of the highways at the intersection some good was accomplished, for through traffic on the lower level could proceed right along. But cars emerging from the lower level onto the upper must squeeze into the fast moving stream above. Cars on the upper level, making left turns to reach the cross highway, must make an even more difficult maneuver, dodging both the traffic behind them and the opposing traffic, and keeping clear of cars making left turns from the opposing lane.

The rotary junction is better, for it eliminates the danger of cars approaching at right angles to each other, from which head-on crashes occur. Although, in principle, traffic can move freely around the circle, cars have to swing from one lane to another. The result is generally confusion and delay, and often sideswipes and rear-end smashes.

Virtually all these difficulties and risks disappear with the clover leaf intersection of the type that New Jersey has pioneered in building, to take care of the immense traffic streams created by the Holland Tunnel and the George Washington Bridge. If the clover leaf junction is of two highways having a raised strip in the middle to divide opposing lines of traffic, then the safest intersection





"Stop, Look and Listen" signs mean nothing here as autos zip over once dangerous railway crossing.

devised by today's engineer is produced. Here, not only are the risks of collisions and sideswipes practically ruled out, but delay and congestion are eliminated, since at no time do cars cross one another's path.

No city has yet built a true Limited Way. Its cost, considering that it must run through thickly populated centers and require rights of way of from 250 to 300 feet, is apt to run up to $400,000 a mile, or much higher in some cases. But already encouraging beginnings have been made in a surprising number of instances. The twin Holland Tunnels between New York and New Jersey, under the Hudson River, constitute perhaps the most complete example of Limited Way, with one tube for traffic each way, no side-roads or intersections, and no encroaching property.

Other examples abound in which at least an approximation is made to the Limited Way ideal. The West Side Elevated Highway along the Hudson River in Manhattan; the mighty Triborough Bridge, connecting Manhattan with Long Island on the east and the Bronx on the north; the George Washington Bridge spanning the Hudson from New York to New Jersey—all demonstrate how traffic engineers are trying to solve the greatest traffic problem in the world—that of metropolitan New York.

New Jersey, with its $6,000,000 a mile Pulaski Skyway soaring over Jersey City from the Holland Tunnel, sends this mighty stream speedily away; Connecticut has its Merritt Parkway and Delaware its Du Pont Highway, while Massachusetts, with its Worcester Turnpike between Boston and Worcester, provides not only a road divided in the middle for safety, but one of the most beautiful concrete roads in the country. Detroit, with the system of super-highways it is completing; Chicago, with its Outer Drive; St. Louis with its depressed highway, and Milwaukee with its Blue Mound Road, all indicate that cities are alert to the principles of the Limited Way.

A Safety Program For YOUR Town

EDUCATION—Organize a permanent campaign (not a short-lived "drive") to secure the co-operation of drivers and pedestrians in reducing accidents.

—Teach driving in the high schools; safety habits in the elementary schools.

—Through safety contests, meetings of civic groups, the press and radio, create a saner attitude toward driving. Fight the speeder, the reckless and drunken driver.

The National Safety Council, The Metropolitan Life Insurance Company, and the National Bureau of Casualty and Surety Underwriters, for example, have prepared detailed programs for more efficient traffic control that almost every community can apply.

ENGINEERING—Secure the services of a specially trained traffic engineer.

—Establish an Accident Prevention Bureau in the Police Department and a trained police accident investigation squad. Adopt a standard system of reporting and recording accidents.

—Study hazardous locations and remove potential sources of danger.

REGULATION—Adopt the uniform traffic regulations and municipal ordinances recommended by National Conference on Street and Highway Safety. Use the signs, signals, markings and traffic control devices it recommends.

—Set up a motor vehicle inspection lane and issue certificates to safe cars.

ENFORCEMENT—Establish an adequate traffic patrol with trained officers.

—Set up a special traffic court to deal only with traffic cases.

—Abolish ticket-fixing.

In many other ways the traffic engineer endeavors to reduce highway hazards. For instance, builders of the Albany-Schenectady Highway have supplied underpasses at four

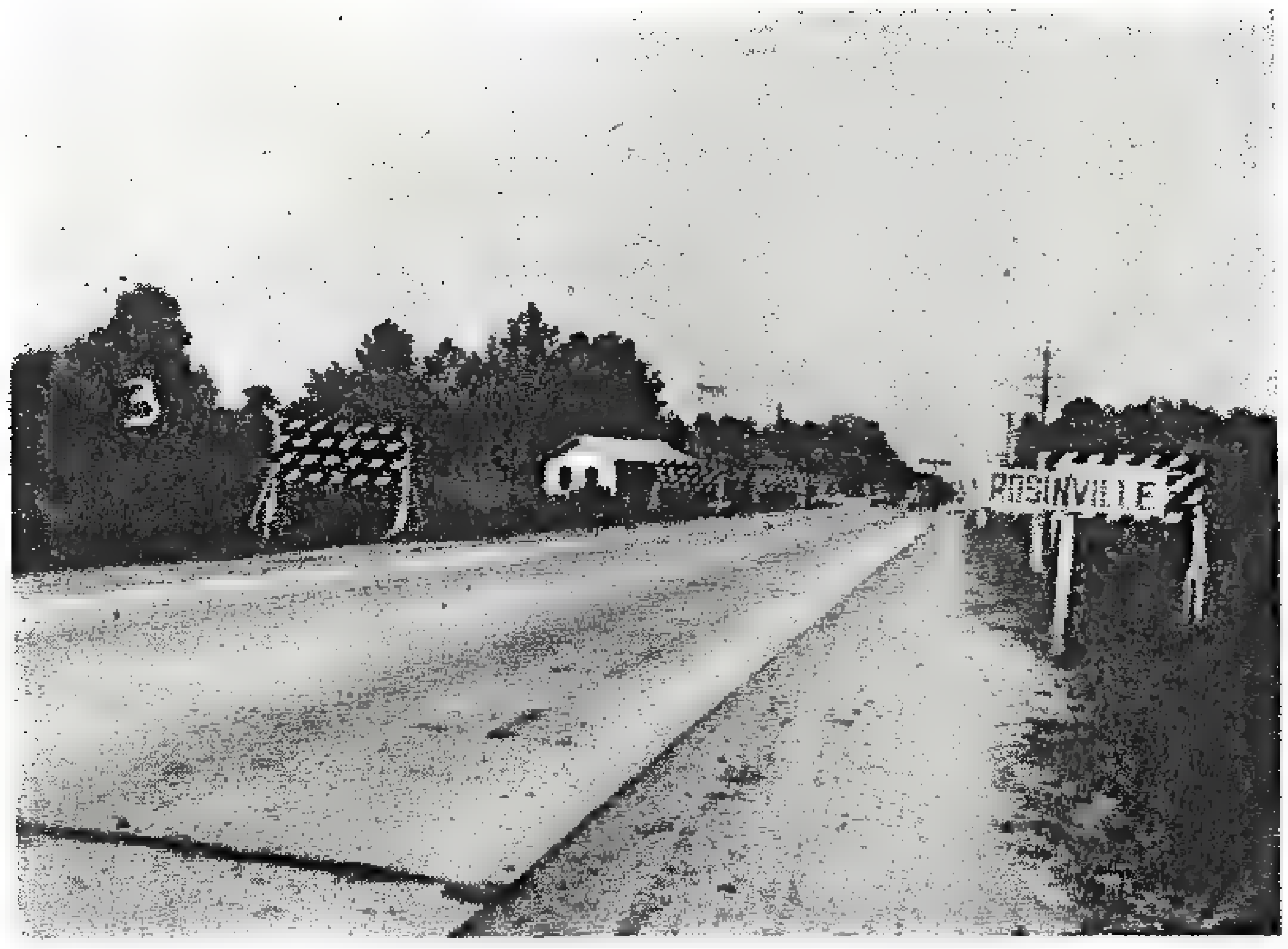
[*Continued on page* 138]

Model Railway Used For Instructing Trainmen

THE value of model railway operation as a means of instructing railroad men in the handling of real trains is fully realized by the London Transport Company, operators of the underground railway system in London, England. Applicants for positions with the company must attend a course of instruction at a school which features a complete model railway system.

The model trains are electrically operated and the cars resemble those used by the company. Supervisors explain railway operation problems by placing the model trains in positions at switches, signal towers, stations, etc. The men are thus taught the proper procedure for handling each problem presented for study.

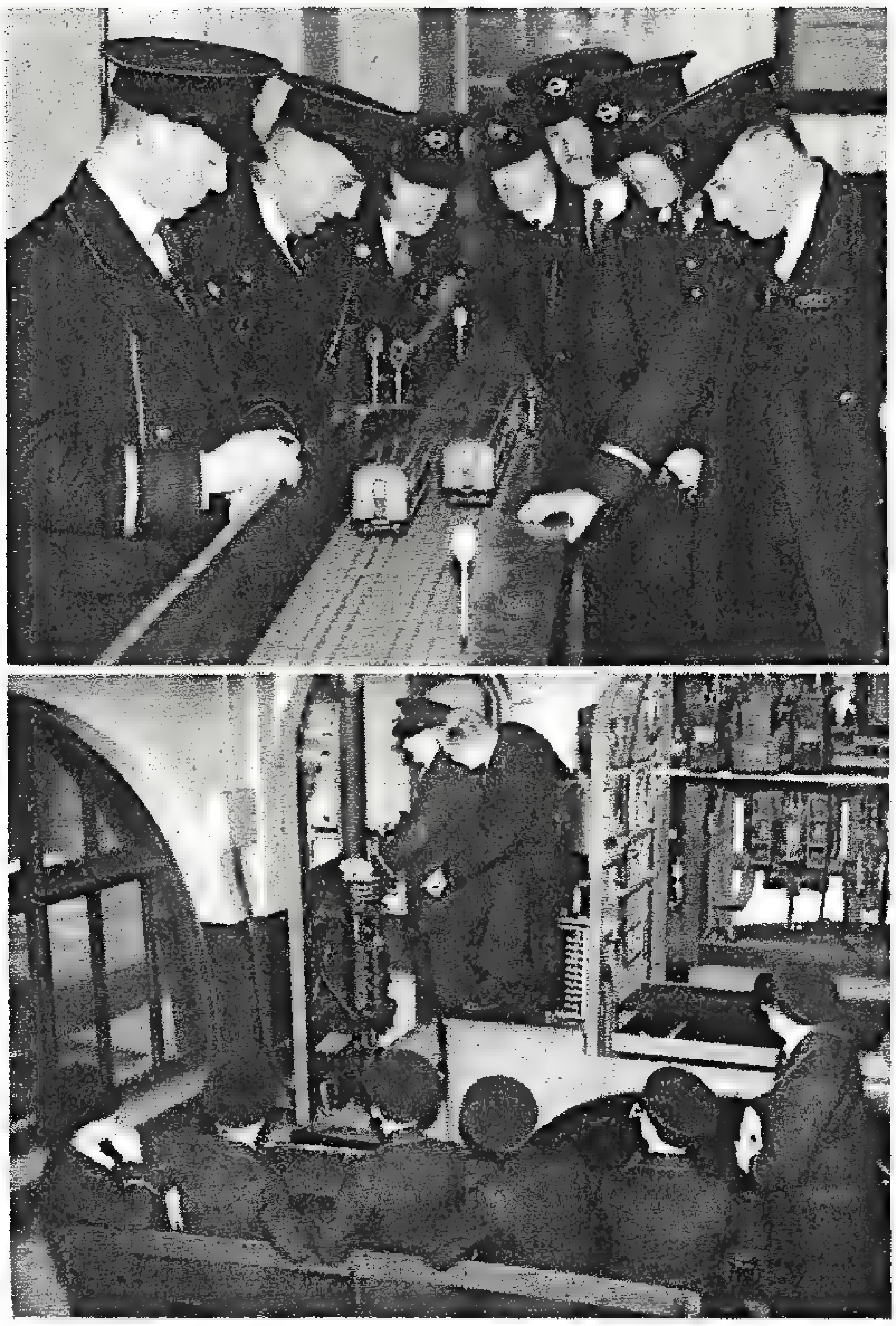
Barriers Reduce Accidents



These black-and-white road shoulder barriers create the optical illusion of closing in as intersection is approached, causing drivers to slow up. They reduced South Carolina crashes.

A NEW and inexpensive method of traffic control originated by the South Carolina State Highway Department consists of non-mechanical black-and-white road shoulder barriers placed along the approaches to dangerous traffic intersections. They have served to slow down traffic to such an extent that crossing accidents have practically been eliminated.

The barriers are placed in a position at right angles to the road and along both sides of the road. The space between the barriers is reduced as the intersection is neared, creating the optical illusion of closing in on the traffic and thus automatically causing the drivers to slow down.

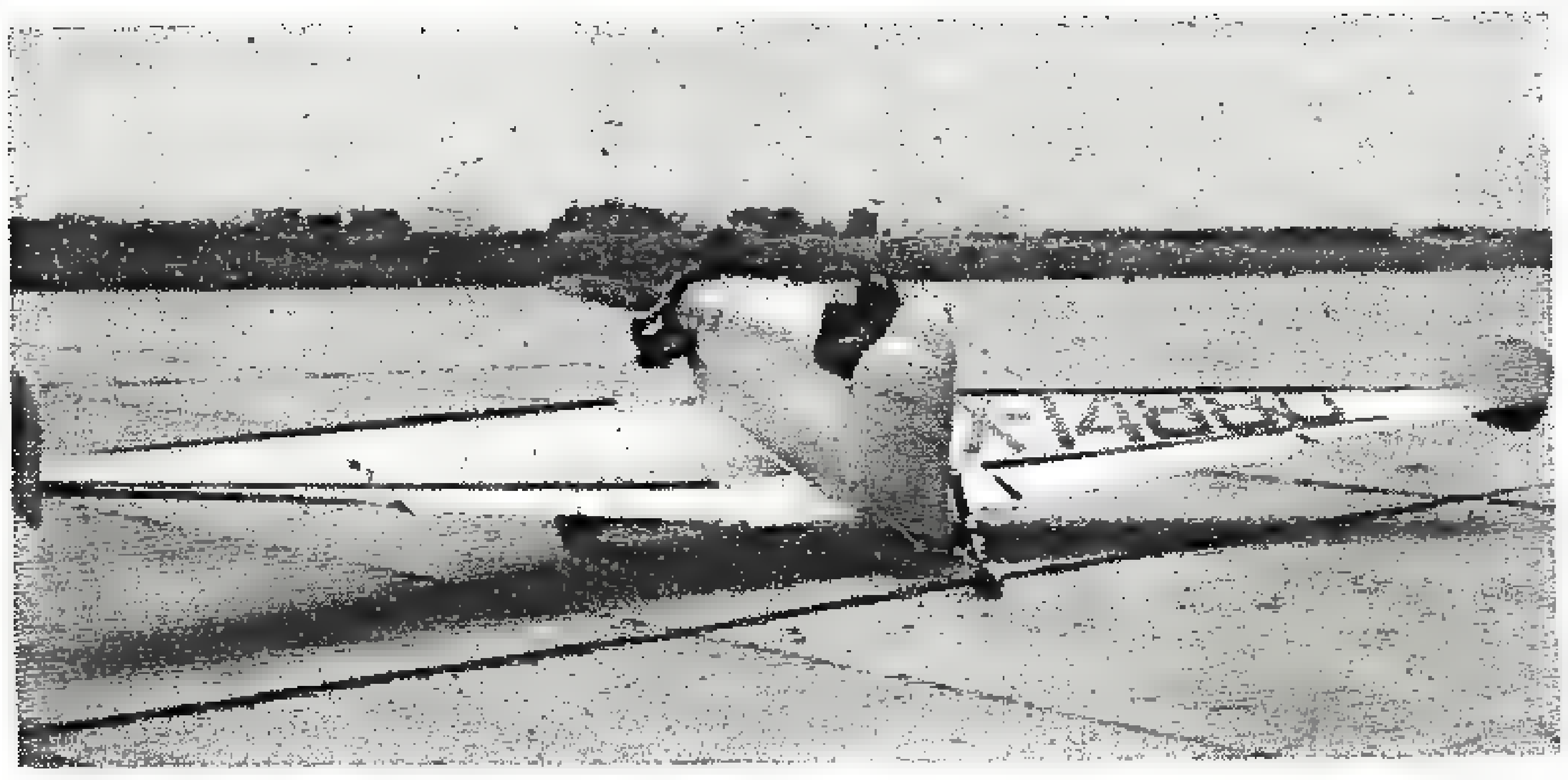


Upper—Student trainmen in London, England, are taught railway operation through use of model system. Lower—Use of brake and power controls is taught in cab of dummy car.

Tailless Airplane Tested

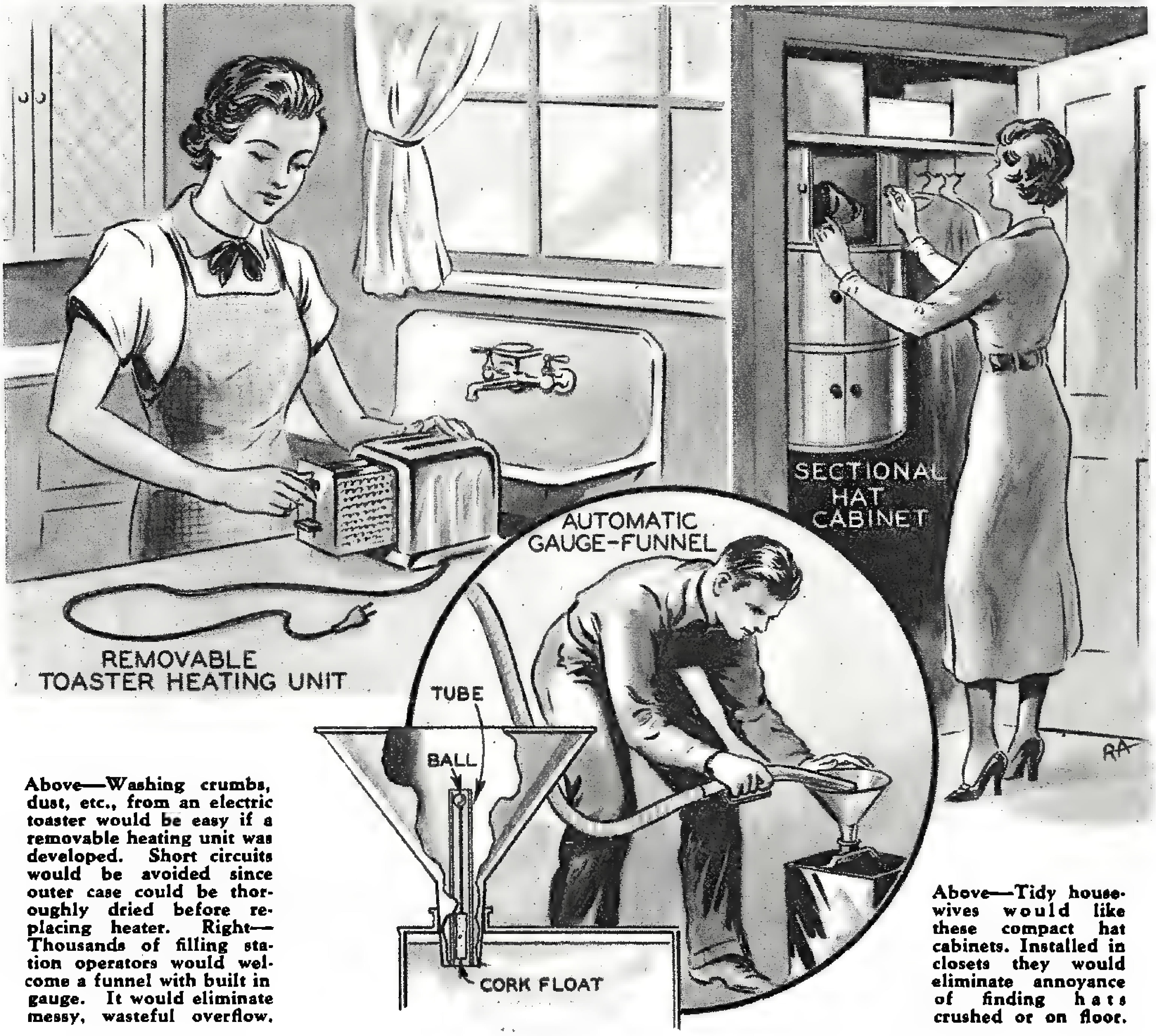
NOVEL in appearance and said to possess flying qualities superior to those of many airplanes of conventional design, a tailless monoplane has been tested at Woll-Chamberlain Airport in Minneapolis, Minn.

The new airplane was tested by Prof. John D. Akerman of the University of Minnesota. In design, the tiny craft is practically a flying wing since it has a fuselage only big enough to seat the pilot and to house the engine. Steering is accomplished through two small rudders, one mounted at each of the wing tips.



Steered by rudders placed at each wing tip, this tailless monoplane piloted by Prof. John D. Akerman, of the University of Minnesota, is said to have excellent flying qualities.

INVENTIONS CONTEST WINNERS SUGGEST IMPROVED HOME AIDS



Above—Washing crumbs, dust, etc., from an electric toaster would be easy if a removable heating unit was developed. Short circuits would be avoided since outer case could be thoroughly dried before replacing heater. Right—Thousands of filling station operators would welcome a funnel with built in gauge. It would eliminate messy, wasteful overflow.

Above—Tidy housewives would like these compact hat cabinets. Installed in closets they would eliminate annoyance of finding hats crushed or on floor.

IDEAS for improving everyday household aids predominated the entries in the Needed Inventions Contest this month. First prize of $25 cash was awarded to Warren Favor, of Boston, Mass., for his suggestion of a removable heating element in electric toasters.

PRIZES

First Prize	**$25.00 in Cash**
Second Prize	**10.00 in Cash**
Third Prize	**5.00 in Cash**
Three Fourth Prizes	**2.00 each**
Four Fifth Prizes	**1.00 each**
Total—10 Prizes	**50.00 in Cash**

Housewives could wash the toaster instead of being confined to brushing out crumbs, etc., if Mr. Favor's suggestion was adopted. There would be no danger of a later short-circuit due to a wet wire as the removable heating element would not be placed in the water with the rest of the toaster for cleaning.

John Houtzer, of Lima, Ohio, won second prize of $10 cash with his suggestion for a compact hat cabinet that could be attached to the shelf of any ordinary clothing closet to eliminate the annoyance of finding one's hat crushed or on the closet floor as so frequently happens.

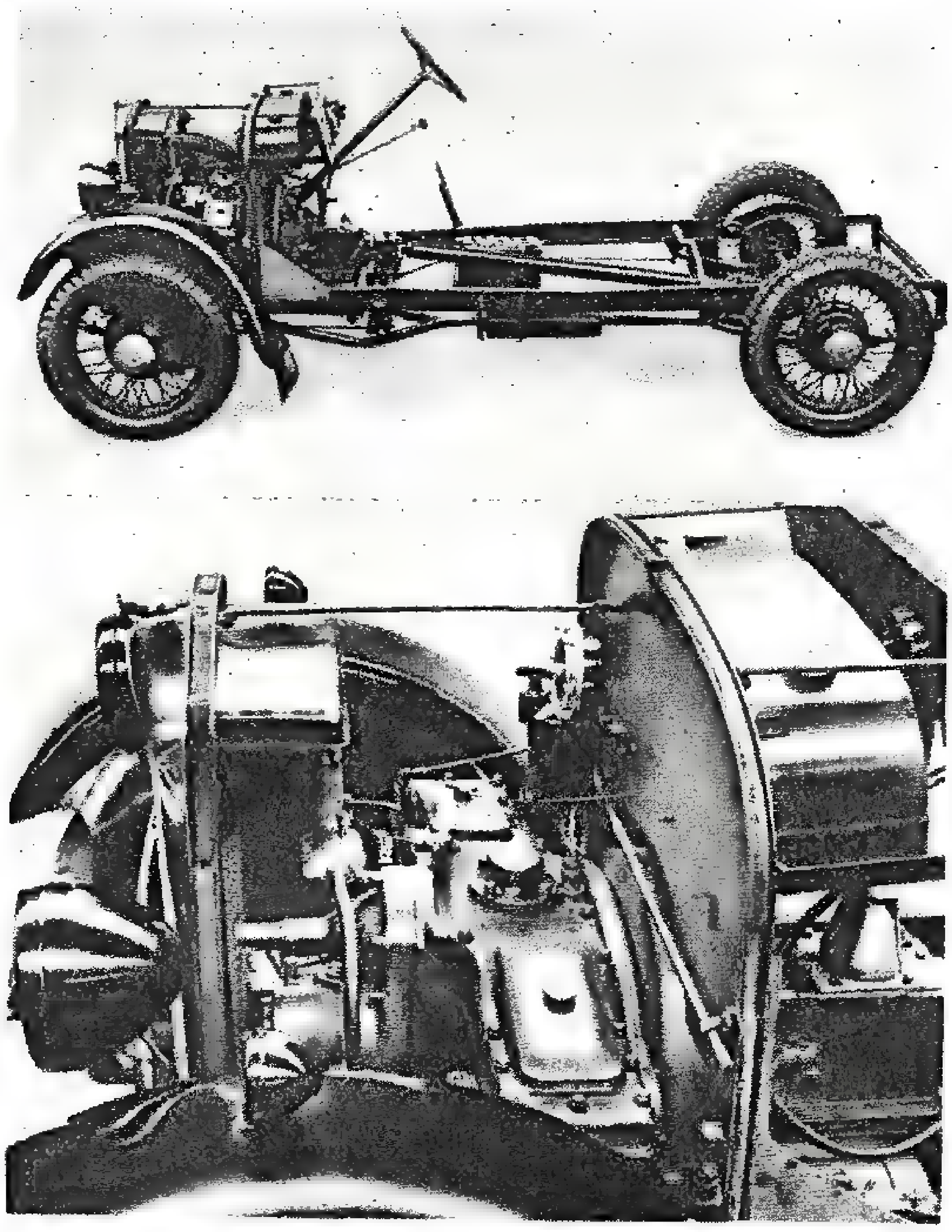
Thousands of filling station operators would

[*Continued on page* 136]

Claim 65 Miles Per Gallon For Diesel Truck

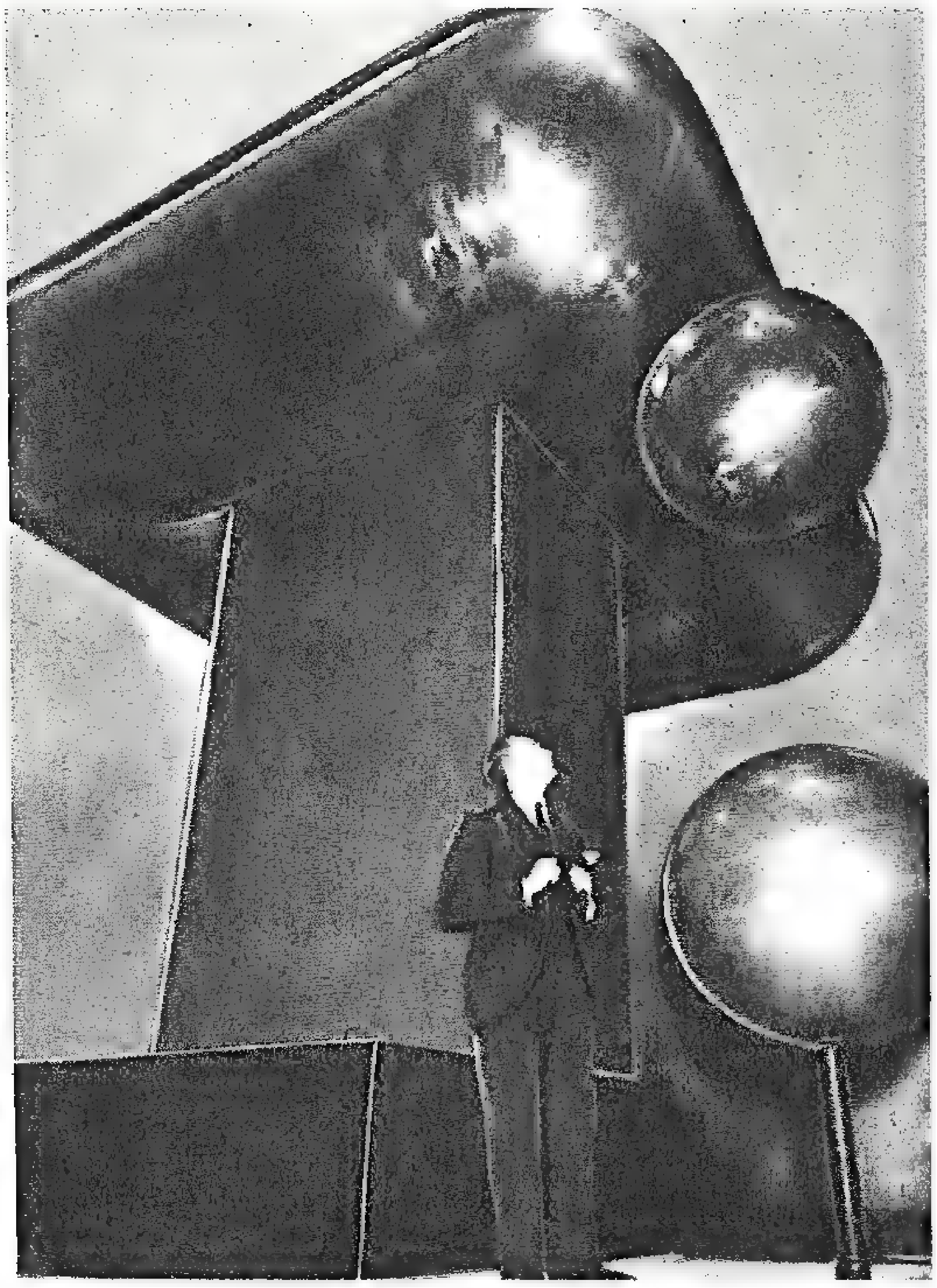
REPORTED operating at a cost of less than one-eighth cent per mile for fuel and lubricating oil, a loaded truck powered with a Diesel engine completed a 2,000-mile test run. Economical operation of 65 miles per gallon of fuel oil was maintained in heavy stop-and-go traffic, it is claimed. A speed of 50 m.p.h. was attained at times.

The Diesel engine was developed by the Covic Diesel Engine Co., of Burbank, Calif., and is a two-cylinder, horizontally opposed, four-cycle, water-cooled type. Cold starting of the engine is accomplished either by geared handcrank or an electric starter. The motor develops 15 to 18 horsepower at 500 to 3,500 revolutions per minute.



Top—Installation of a Diesel engine in this 1½-ton truck resulted in one-eighth cent per mile operating costs. Lower—Closeup showing the compact 2-cylinder Diesel engine used.

Generates A Million Volts

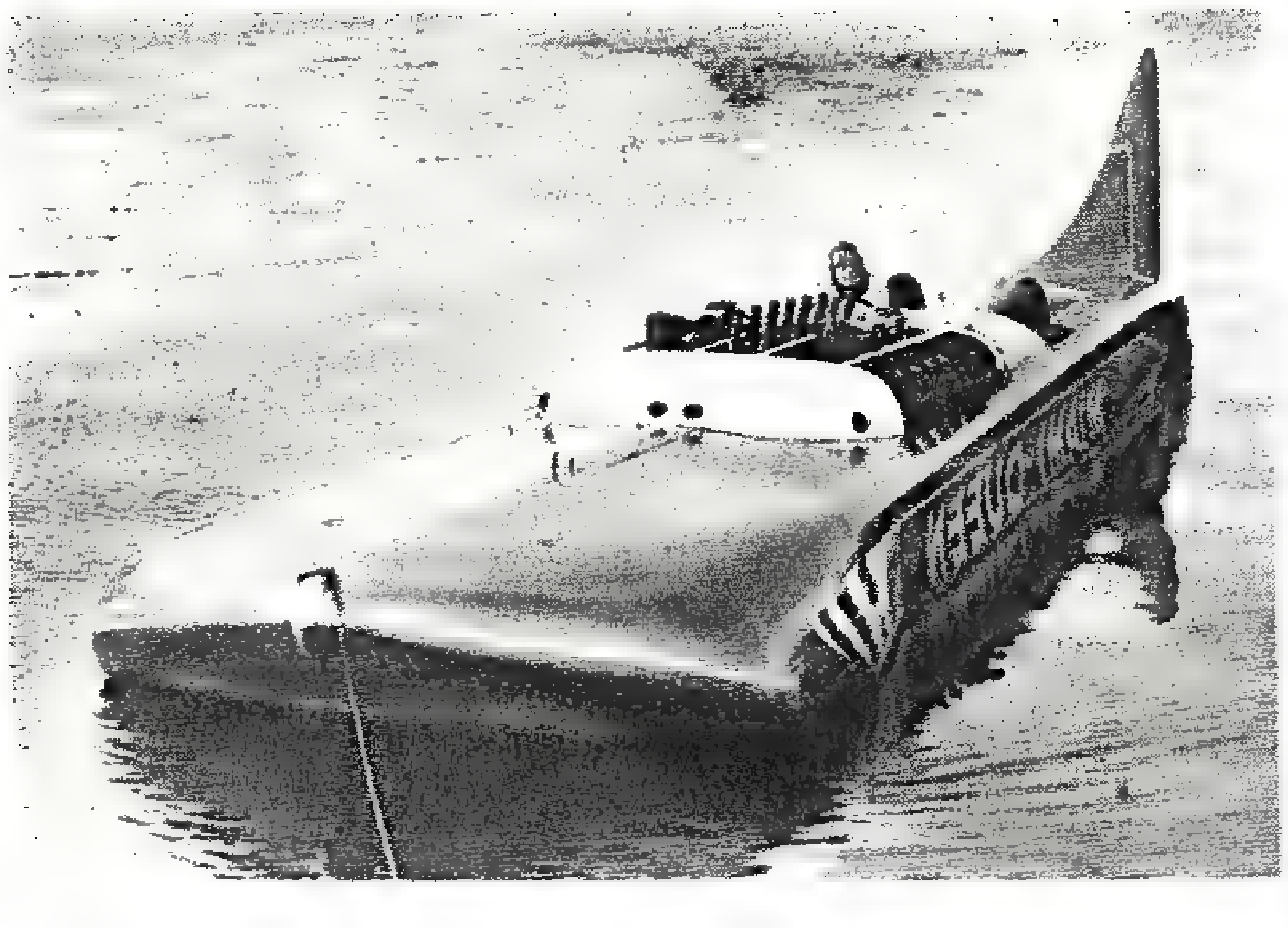


Dr. John G. Trump examines the million-volt electrostatic generator he developed for a Boston hospital. It operates giant X-ray tube to provide radiations for cancer treatments.

A MILLION-VOLT direct current electrostatic generator developed by Dr. John G. Trump, of Massachusetts Institute of Technology, has been installed in Huntington Memorial Hospital of Boston. The high voltage will be harnessed in a giant X-ray tube to produce radiations for cancer treatments.

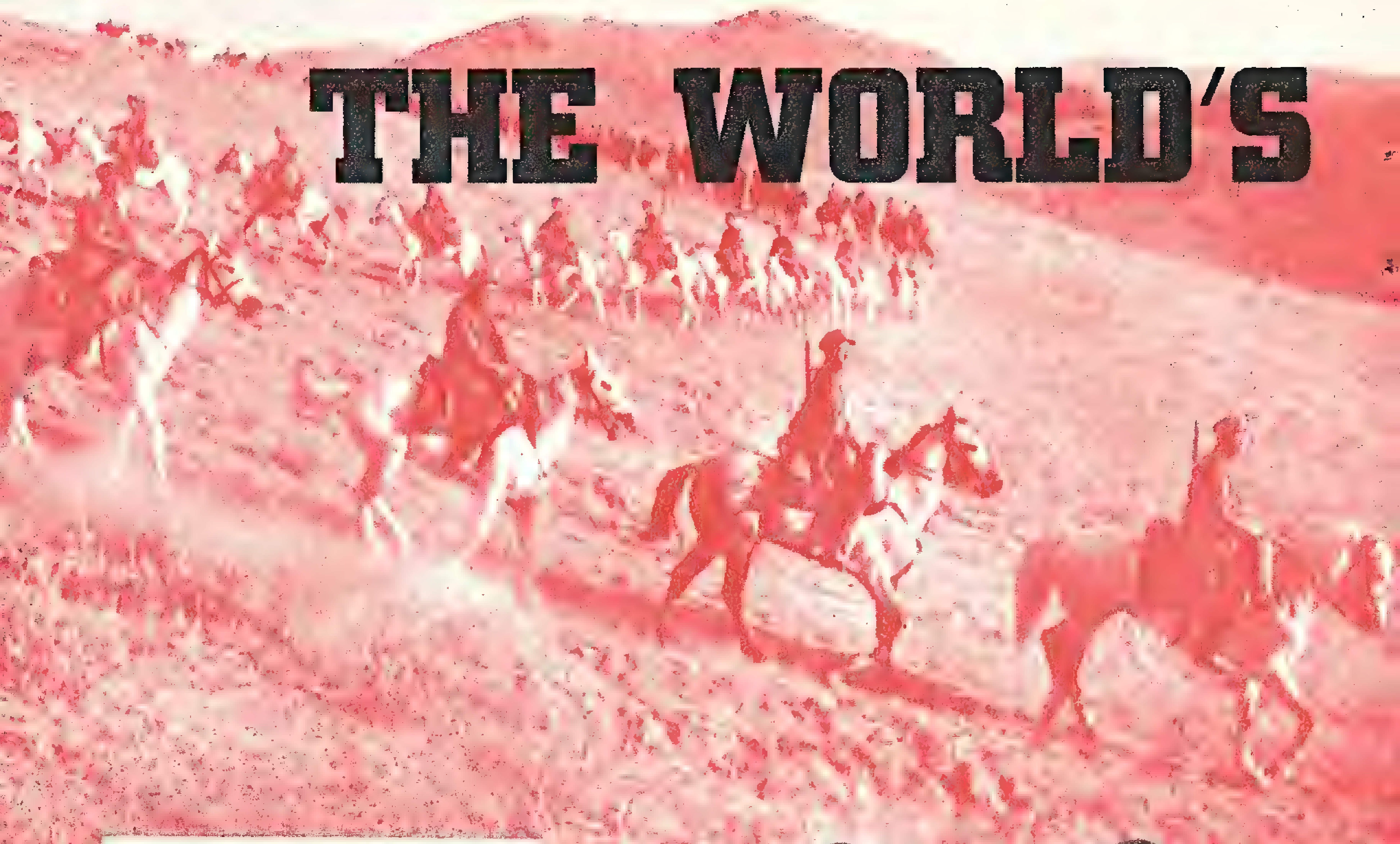
America's Newest Speedboat

AMERICA'S newest design in speedboats has been developed by Louis Nuta, veteran Italian speedboat enthusiast of Miami, Florida. The craft is powered with two twelve-cylinder motors which develop 900 horsepower using a new type V belt dual roll drive. Nuta hopes to travel at 130 m.p.h. at the Miami International Races in March.



In his newly designed speedboat, Louis Nuta, of Miami, Fla., will try to beat Gar Wood's record of 124.86 m.p.h. at the International Races in March. Boat has airplane type rudder.

THE WORLD'S



Facing war on wide fronts from foes in both Europe and Asia, the Soviet has built up the vastest fighting machine of today. Here is how it works—and why it might fail.

Brains for the brawn of the mighty Red Army: Seated, (left to right) Tukashevsky, Commissar of Defense, a former aristocrat and slated commander-in-chief in case of war; Voroshilov, Commissar of War; Vegesov, chief of staff. Standing, Budonney, chief of Cavalry, and Bleucher, head of Far East Army. Top photo shows peasant cavalry in mountain maneuvers.

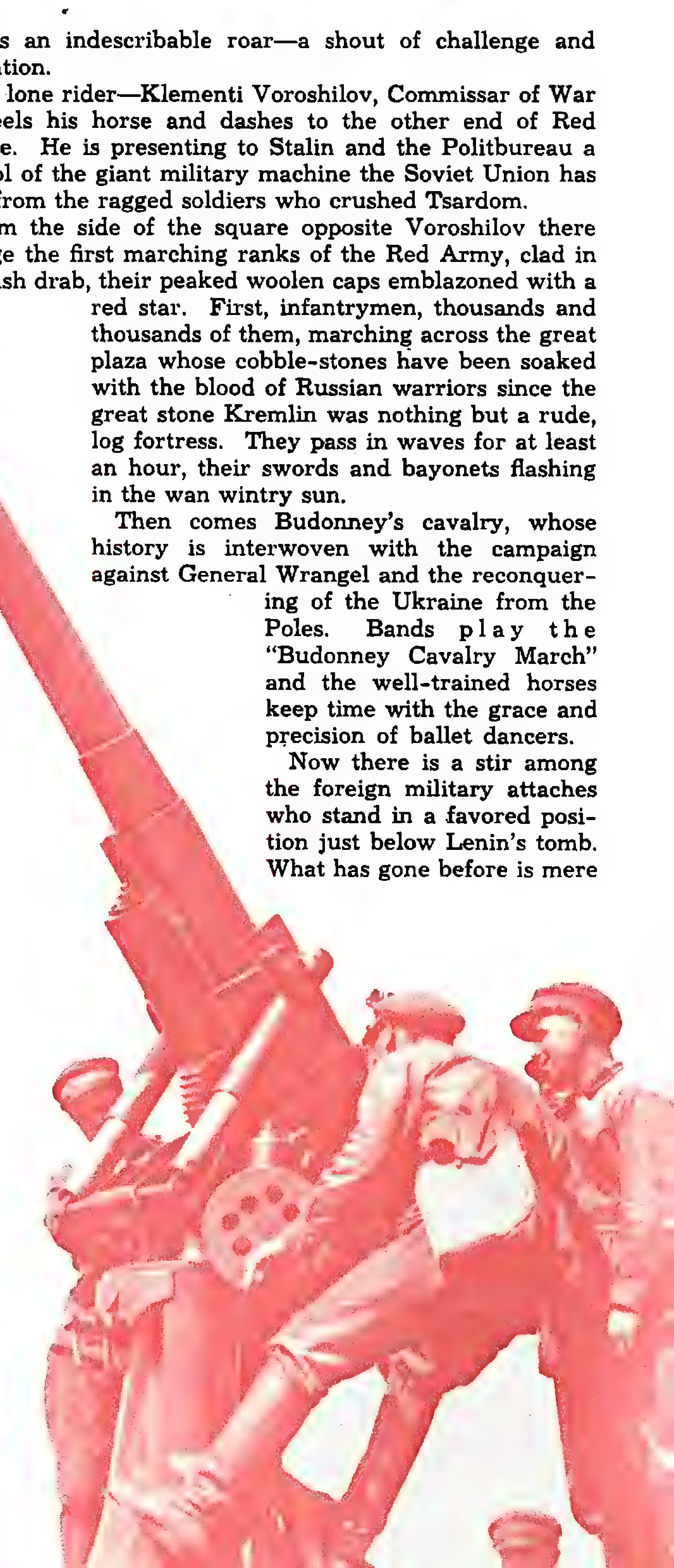
THE chimes in the ancient clock-tower of the Kremlin strike ten. For hours troops have stood in Red Square, shifting their feet for warmth against the cold as they await the arrival of Joseph Stalin and other members of the Communist hierarchy in the reviewing stand atop Lenin's tomb just across the plaza. No sooner have the chimes ceased than Stalin, accompanied by a dozen dignitaries, appears on the parapet.

A black charger, bearing a trim, gray-haired figure in uniform, his sword raised in salute, dashes into the square, passes the line of rigid troops, now at attention, and, wheeling up before the reviewing stand, salutes the leaders. Four military bands strike up the "Internationale," the Communist anthem.

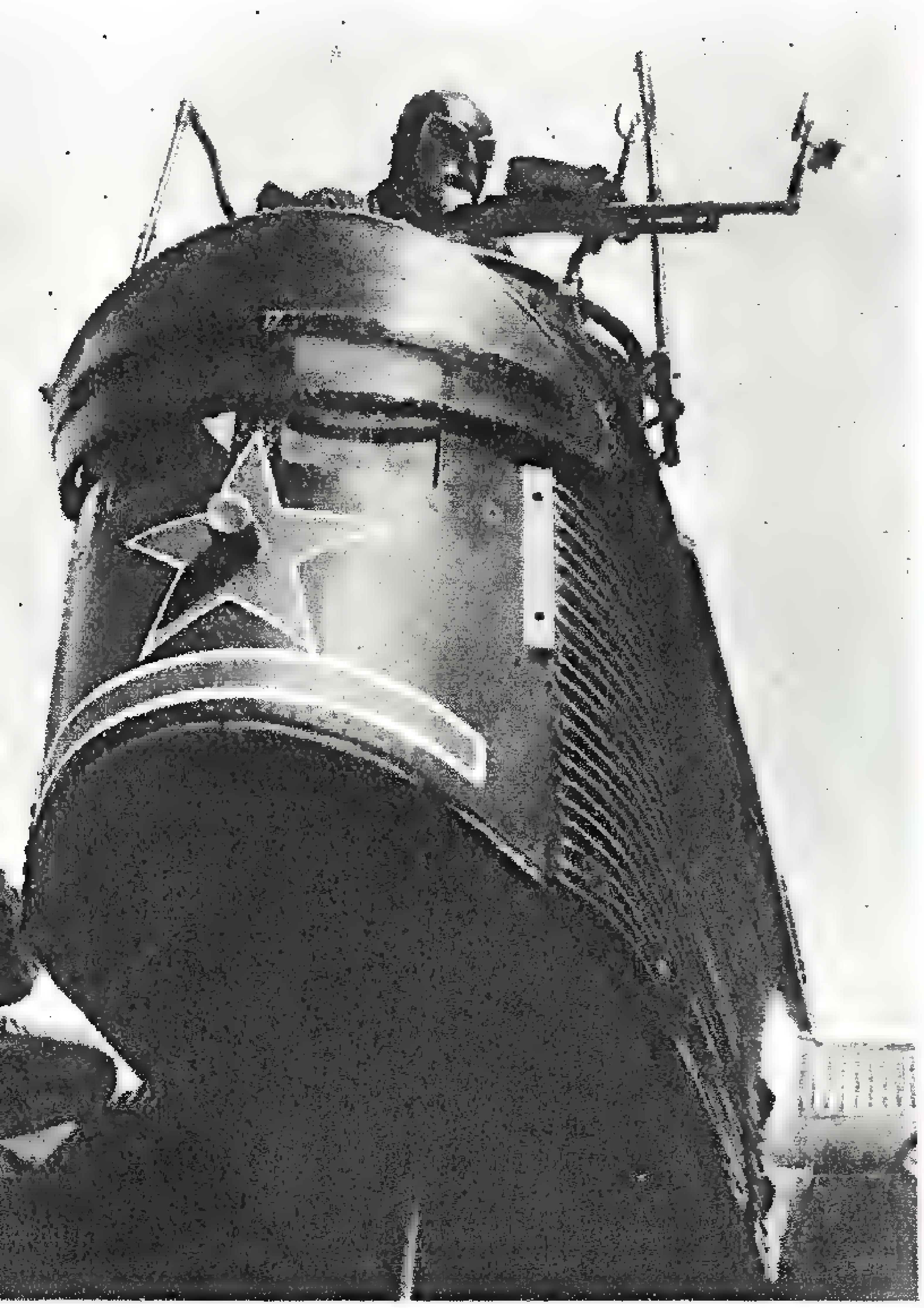
When the last notes have died on the winter air there comes from thousands of deep

BIGGEST ARMY

by
Joseph M. Baird



Artillerymen of Workers and Peasants Army spot sky raiders. Soviet war machine is prepared to meet air attacks in both Europe and Asia.



Below—Bow of a bomber. Soviet pilots have reputation for bravery and skill, but experts criticize slowness of planes, call motors inferior.

throats an indescribable roar—a shout of challenge and exultation.

The lone rider—Klementi Voroshilov, Commissar of War—wheels his horse and dashes to the other end of Red Square. He is presenting to Stalin and the Politbureau a symbol of the giant military machine the Soviet Union has built from the ragged soldiers who crushed Tsardom.

From the side of the square opposite Voroshilov there emerge the first marching ranks of the Red Army, clad in greenish drab, their peaked woolen caps emblazoned with a red star. First, infantrymen, thousands and thousands of them, marching across the great plaza whose cobble-stones have been soaked with the blood of Russian warriors since the great stone Kremlin was nothing but a rude, log fortress. They pass in waves for at least an hour, their swords and bayonets flashing in the wan wintry sun.

Then comes Budonney's cavalry, whose history is interwoven with the campaign against General Wrangel and the reconquering of the Ukraine from the Poles. Bands play the "Budonney Cavalry March" and the well-trained horses keep time with the grace and precision of ballet dancers.

Now there is a stir among the foreign military attaches who stand in a favored position just below Lenin's tomb. What has gone before is mere routine to them, for they have seen hundreds of parades. But in the distance sounds the rumble of tanks. How many will there be and of what type? They are keenly interested in the Red Army's mechanization program.

At the last review I witnessed in late 1935 there were about 550 tanks varying in size from the little "whippets" manned by one soldier and carrying only a machine gun, to the mammoths which can crush a stone building and carry a 3-inch cannon. That this number of tanks can be assembled and complete their run through Red Square with only one or two dropping out for repairs attests increasing technical efficiency.

Then comes the artillery, the standard types employed by all powers: Searchlight batteries, aircraft sound detectors, portable wireless—nothing unusual in this.

Again the military attaches show interest. In the distance they hear the hum of planes. For 20 minutes the sky is darkened by a vast armada—attack planes, observation ships, fast, stream-lined "chasseurs"—but only a few—and then several squadrons of giant four-motored bombers, among the largest military planes in the world. In all, nearly 600 fly overhead, a vast demonstration.

But the ability to parade is no criterion of an army's strength. What is the Red Army? How does it compare with the troops of the Tsar? How would it stand the test of war?

As about most things Russian, there is a tendency, even among military men, to go to fanatical extremes in discussing the Red Army. It is either a "formidable menace to the capitalistic world" or "an ill-organized group of peasants with no staff ability."

One difficulty in making any reliable estimate of the Red Army's strength results from the extraordinary secrecy surrounding it. Mystery is in the very soul of Russia, and it has been intensified under the Soviets by their belief that the whole capitalistic world is their enemy.

Hence it would be presumptuous to attempt here to give more than a general picture, drawn from the Soviet press, two years of residence in Russia and numerous talks with military attaches.

The truth about the Red Army lies somewhere between the two extremist estimates cited. Statistically, it is a standing army of 1,350,000 men, the largest personnel in the world. Its soldiers are recruited on a basis of universal, compulsory military service for two years, except in the technical branches, where enlistment may be for as much as four years. Formerly it was organized on a "territorial" basis—that is, most of its soldiers served in their home districts—but lately it

Training of girls like these in parachute jumping is part of Russia's vast preparedness program. Lower photo shows Army tanks lumbering along village road in war practice. Tanks can also swim rivers.

has been placed on a "garrison" status, which means that about 75 per cent of the troops are stationed at places of strategic importance.

No official figure for Red Army reserves has ever been announced, but a representative of the War Office told the All-Union Executive Committee recently that reserves equalled those of 1914, just before the World War. Then they totalled 10,000,000 men, and that may be taken as a reliable current figure.

Russia's army is highly mechanized; just how highly no one outside the War Office and the Kremlin knows, but as long ago as January, 1934, Voroshilov boasted that its mechanization was higher per man-power unit than that of either the British or American armies. There may be, of course, a higher percentage of machine guns, tanks and armored cars per man-power unit, without this equipment being equal in quality to that of some of the other armies. A military attache of one of the large powers with whom I discussed this question asserted positively that the Russian equipment was inferior in quality. However, he added the point that, if Russia had sufficient technical equipment, it could make up in sheer quantity what it lacked in quality.

Red soldiers man a machine gun in forest. The best dressed of all the Russians, snow and freezing weather fail to faze them on their icy battlefields.

In the field of aviation close secrecy also is observed, but here it is possible to be somewhat more specific. A strength of 7,000 planes was announced in November. A figure near that is generally accepted by foreign military attaches in Moscow.

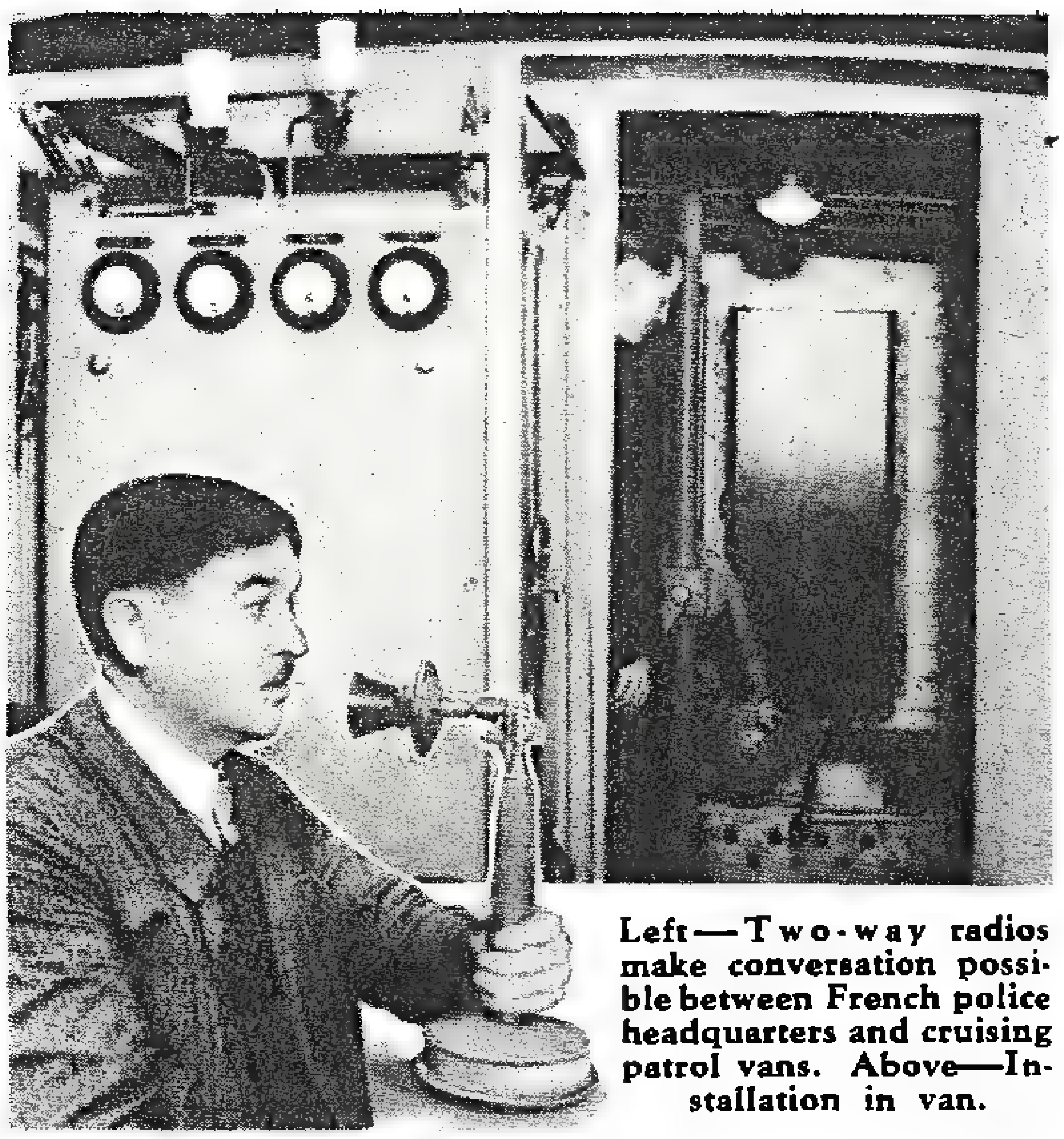
Russian pilots have a reputation for bravery, skill, quick-thinking and prompt nervous reflexes—the qualities of an excellent flier. But, in the opinion of foreign military men, the material of the Russian air force is considerably inferior to that of Germany, Italy, Great Britain and the United States. Indeed, Voroshilov has publicly admitted that the great weakness of the air force is the inferior quality of its motors. Russia has imported some foreign engines, but manufactures nothing comparable to the 1,250-horsepower giants which drive the latest types of American military planes.

The Soviet state, probably because of the threat of prompt retaliation by air which it wants to hold over Japan to discourage that country from invading Siberia, has placed great emphasis on heavy bombers. I have seen in the air at one time as many as three squadrons of these giant, four-motored ships with a tremendous bomb carrying capacity, and they came from a single field in European Russia. It is understood that most of them are stationed in the Far East, in the area around Vladivostok. They are capable of

[*Continued on page* 138]

This big gun is easy to unlimber as it lumbers up to firing line on caterpiller wheels. The Red Army, biggest in world, is said to have highest percentage of technical equipment per man of any fighting force. Besides standing army of 1,350,000 men, there are 10,000,000 in reserve.

Parisian Police Install Two-Way Radio System



Left—Two-way radios make conversation possible between French police headquarters and cruising patrol vans. Above—Installation in van.

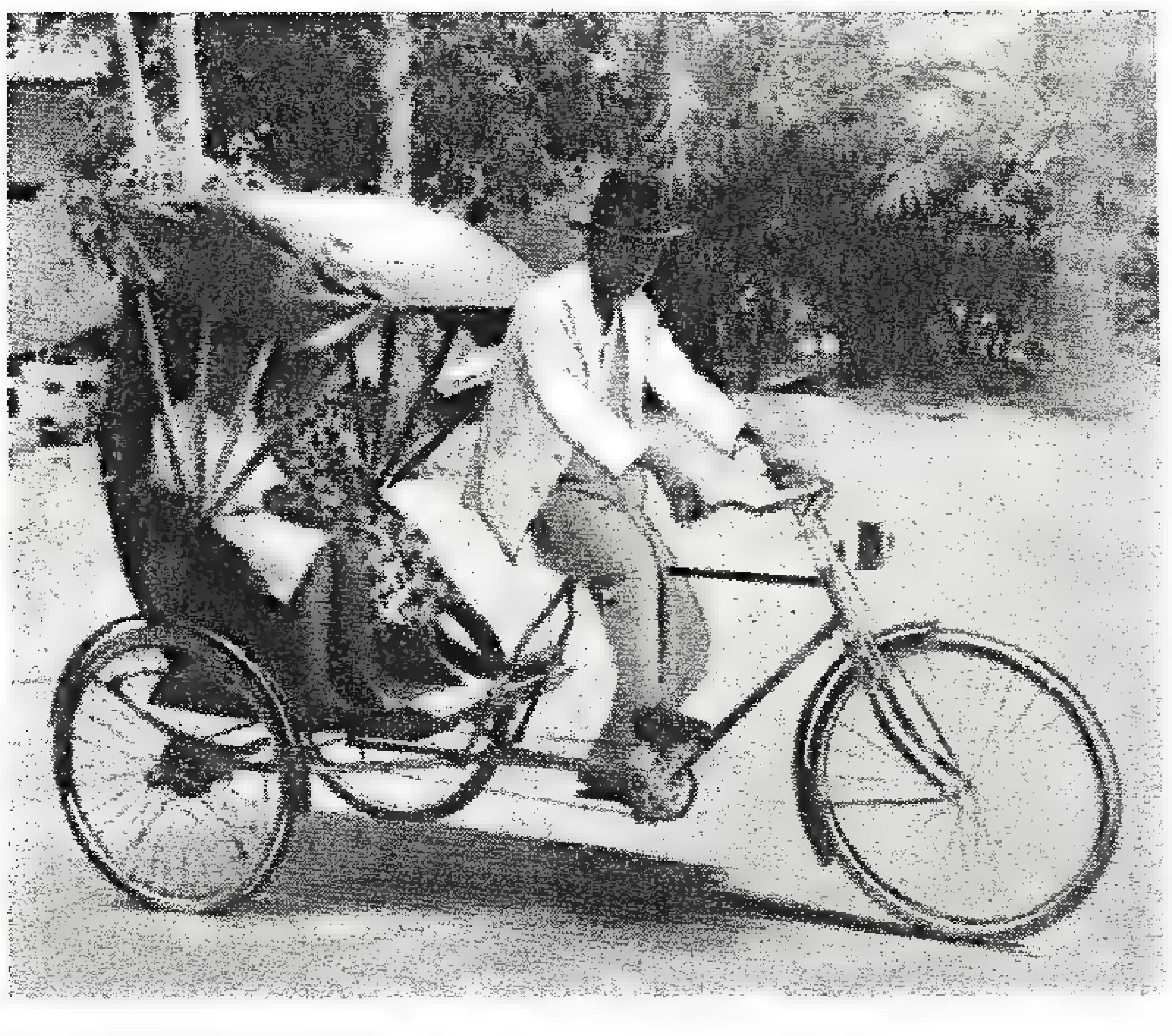
AS AN aid in the swift apprehension of criminals, the Paris (France) police department has installed two-way radio sets in its patrol autos and vans. The short wave sets make it possible to receive and transmit messages between the central police headquarters building and the cruising patrols throughout the city. Before adoption of the new sets, the police cars were equipped with sets for receiving broadcast messages only.

Until the police personnel acquired skill in the operation of the new equipment, a corps of radio experts was retained to provide instruction. Similar two-way radio sets are being installed by the New York City fire department.

Bicycle Rickshaw Devised

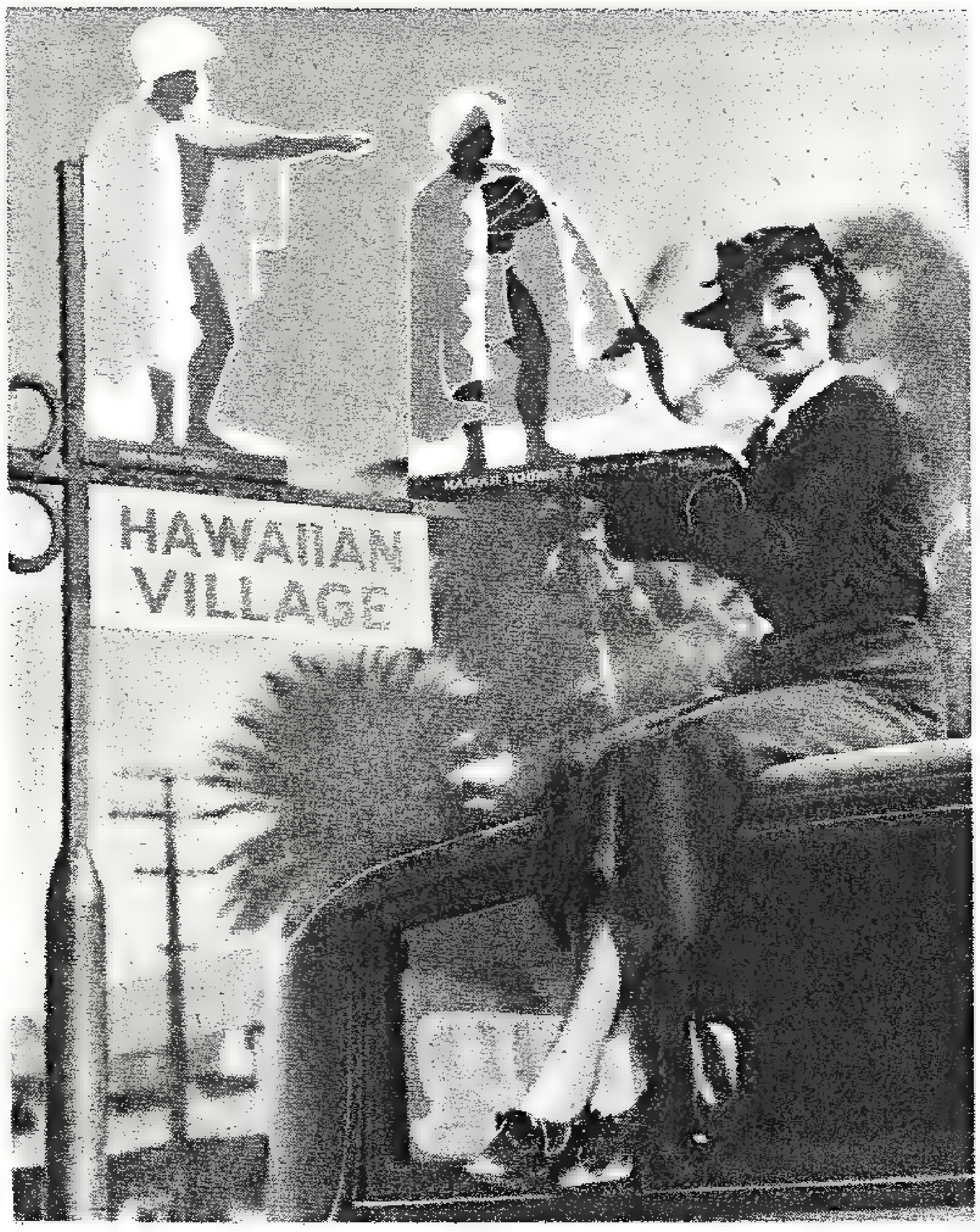
FASTER and more humane than the old type hand-pulled rickshaw, which made its human operator a beast of burden, a new pedaled vehicle has made its appearance in Penang, British Malaya. If successful, a fleet of 50 will be placed in operation.

The pedal rickshaw was developed by a Chinese and consists of a metal tubing chassis to which a covered rickshaw body has been attached. The front of the vehicle resembles a bicycle and the operator, seated on a regular bicycle seat, can motivate and steer the rickshaw by means of pedals and handlebars.



Pedaled like a bicycle, this new type rickshaw has speeded up street transportation in British Malaya. Invented by a Chinese, the odd locking vehicle replaces the old hand pulled rickshaw.

Hawaii Changes Road Signs



Because Hawaiian signs showing a warrior pointing were declared undignified, authorities devised new signs showing warriors with folded arms. Young lady holds signs for comparison.

BECAUSE Hawaiian societies and historians objected to metal roadside signs depicting Hawaiian warriors pointing to local attractions, on the grounds that a warrior would never assume such an undignified pose, authorities have replaced the signs with new ones in which the warriors merely stand with folded arms. They are the only type of outdoor sign allowed in Hawaii.

Priest Develops Practical Psychogalvanometer

A PSYCHOGALVANOMETER invented by Father Walter G. Summers, head of the department of psychology at Fordham University in New York City, is said to be a practically infallible lie detecting device.

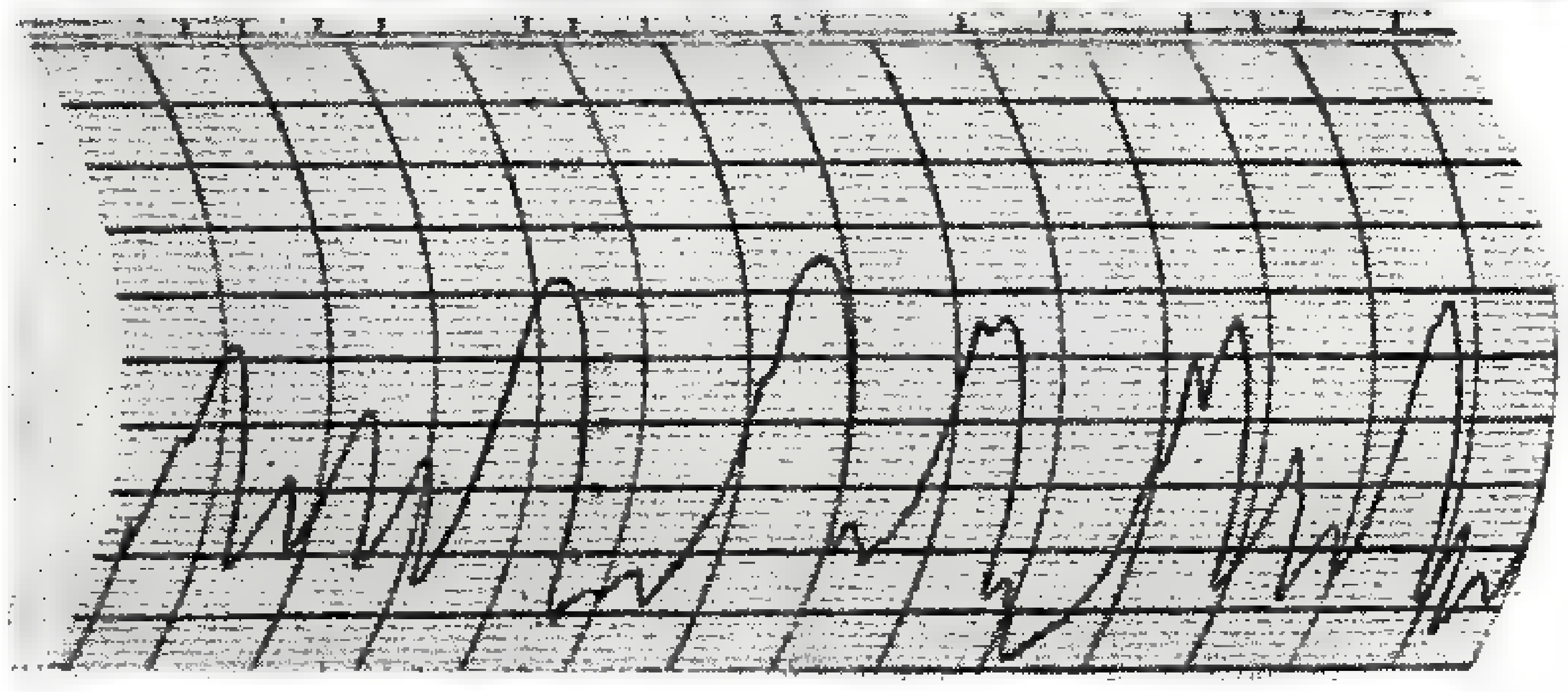
The apparatus consists of two boxes. One, resembling a radio set, contains a system of balanced electric circuits. The other, a milliammeter, produces a chart tracing of the emotional reactions of the person being tested. The combined apparatus amplifies the electrical charge inherent in the human body to such an extent that variations, caused by the emotions, cause a change in the tracing.

Awarded Hoover Gold Medal

Honored by representatives of America's four ranking engineering societies, Ambrose Swasey, Cleveland, Ohio, manufacturer of scientific instruments, was awarded Hoover Gold Medal.

THE American Society of Mechanical Engineers has cited Ambrose Swasey, chairman of Warner & Swasey Co., Cleveland Manufacturers of turret lathes and telescopes, to receive the Hoover Gold Medal, awarded by engineers to a fellow engineer for distinguished service.

Mr. Swasey, 90 years old, has devoted his life to the development of scientific instruments. In 1914, he established the Engineering Foundation for sponsoring research.

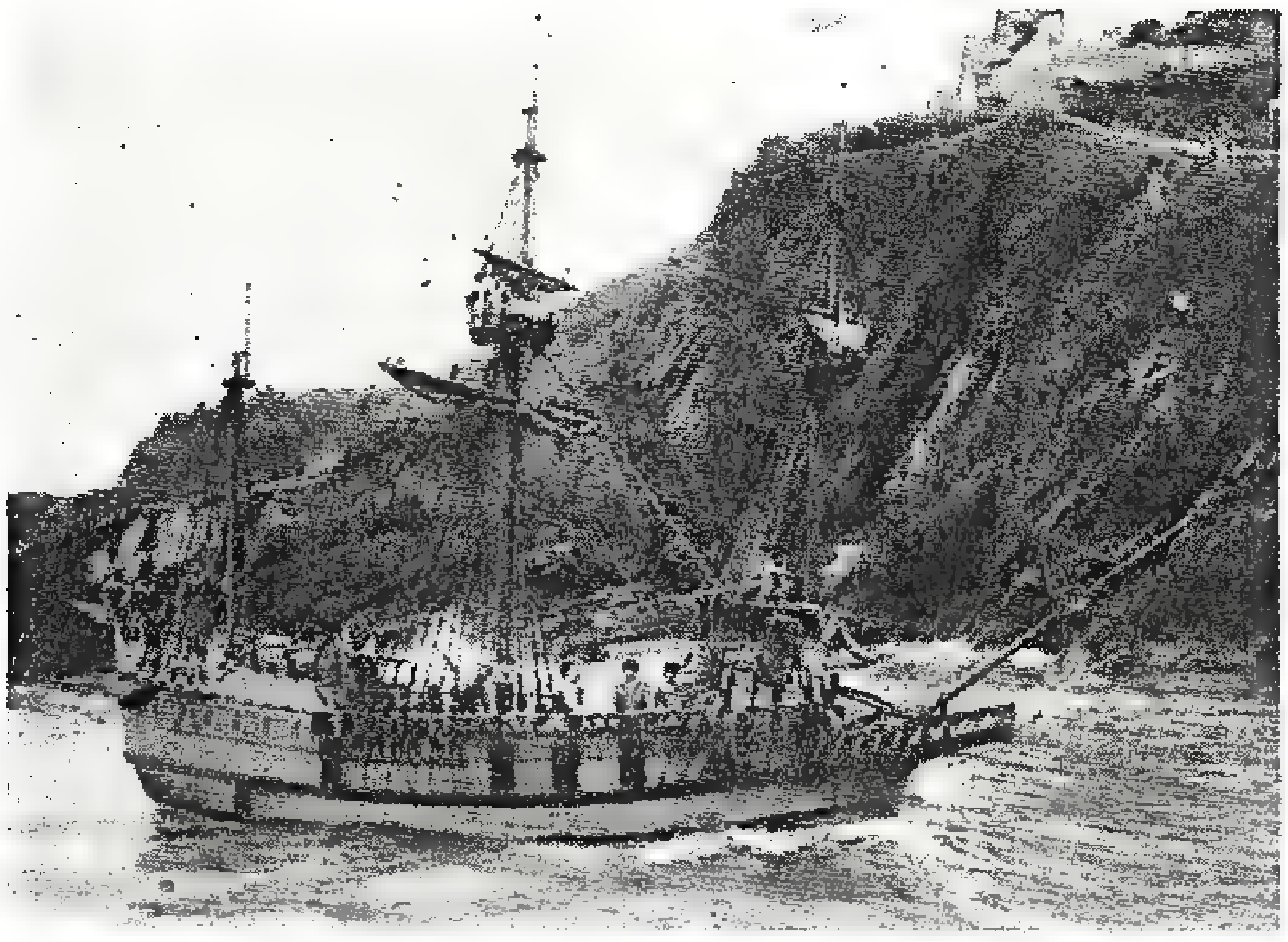


Top—Father Walter G. Summers, of Fordham University, tests Dorothy O'Day with his psychogalvanometer. Device indicates when person lies by tracing lines on chart. Bottom—Wavy lines on chart indicate emotional reactions to questions.

Model Ship Has Real Crew

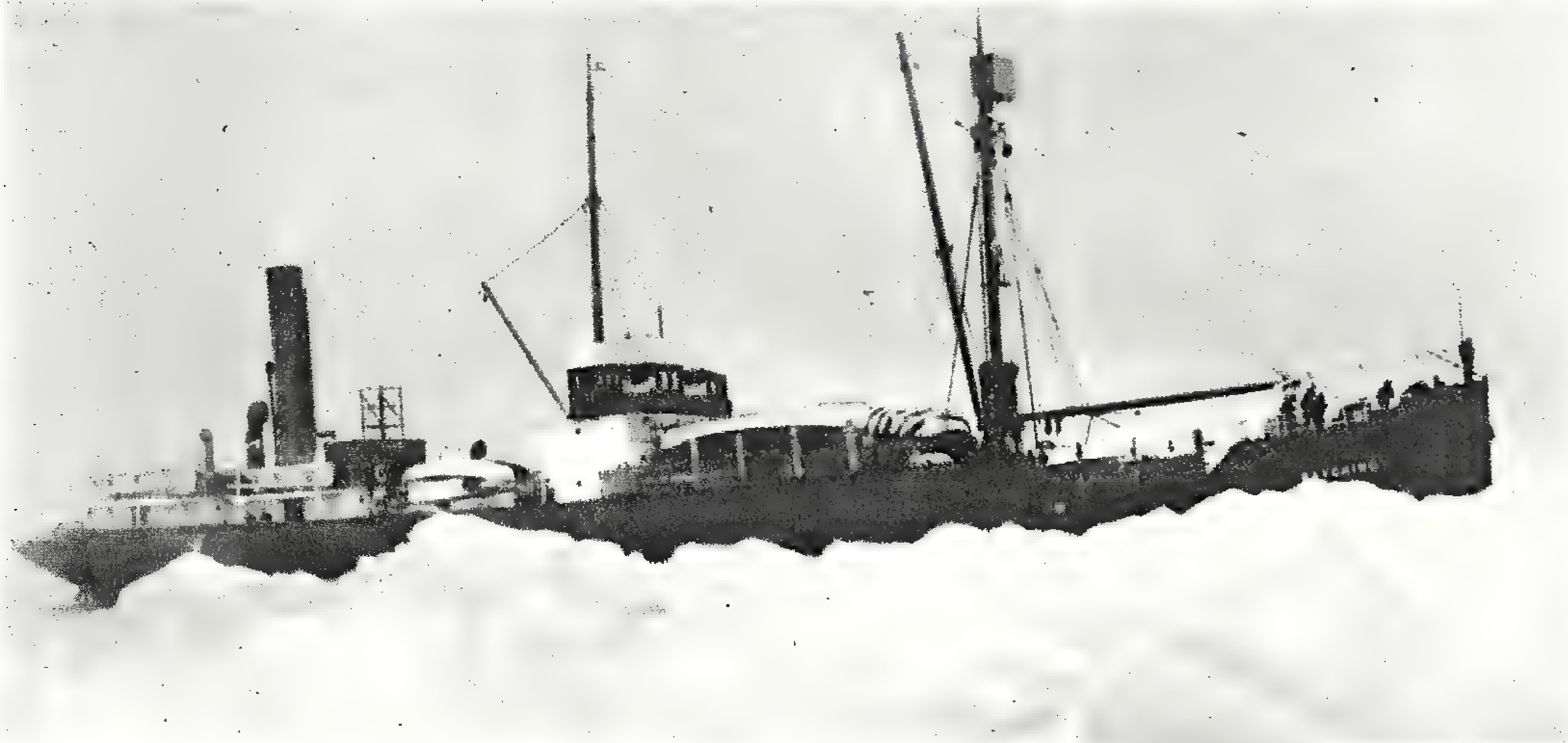
AS PART of a program developed to celebrate Navy Week in England, a small sailing model of Sir Francis Drake's famous ship, the Golden Hind, was constructed. Placed in the sea at Devonport, she sailed for Fowey with a small crew aboard to take part in the naval parade there.

En route, heavy seas forced the tiny vessel to seek the safety of the harbor at Looe where she awaited more favorable conditions. Later, she sailed the Devon and Cornish seas serving as a comparison with present day battleships of the Royal Navy.

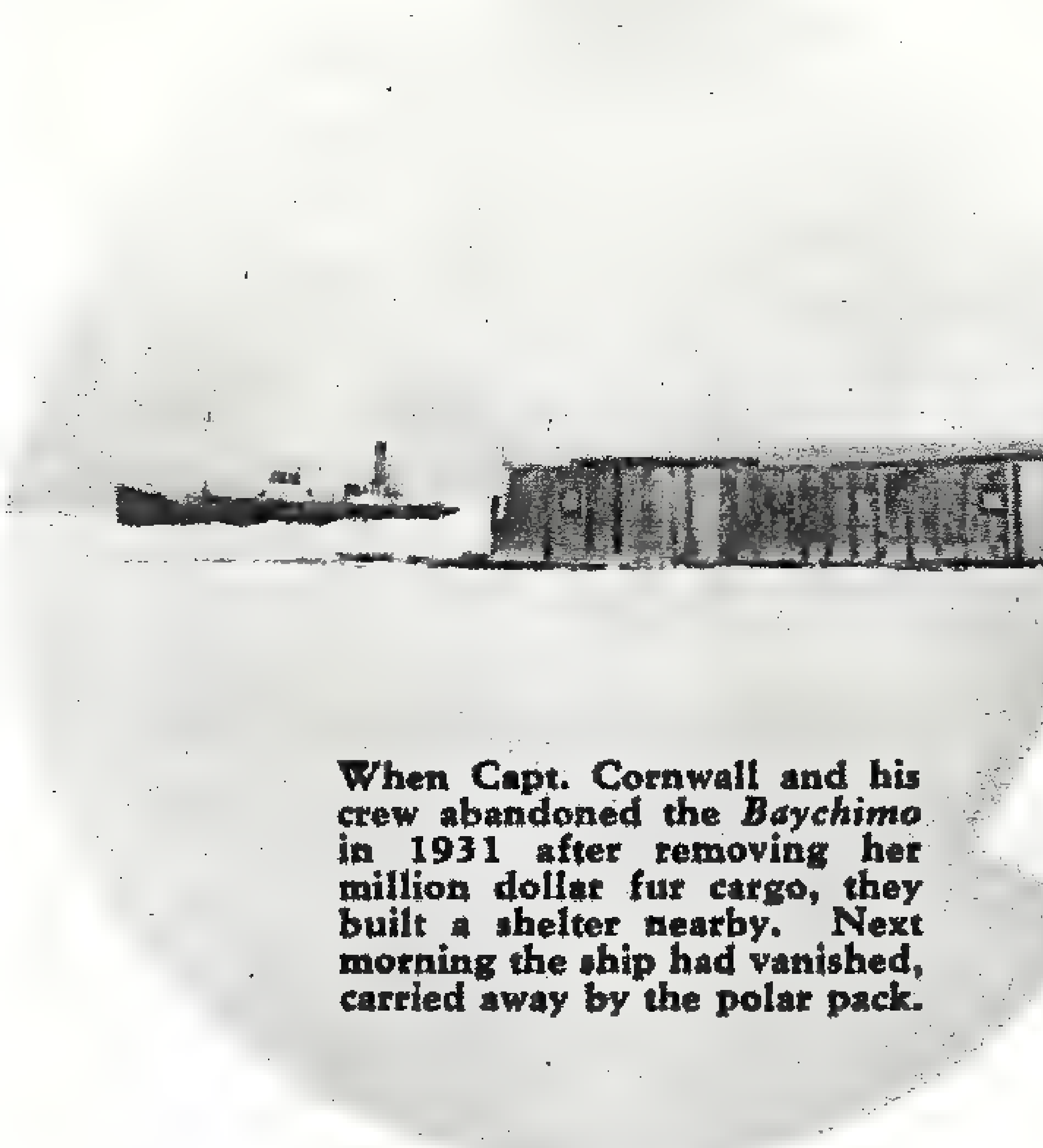


Modeled to represent Sir Francis Drake's famous ship, the Golden Hind, this tiny vessel and a special crew took part in Navy week celebration in England. Storm almost wrecked it.

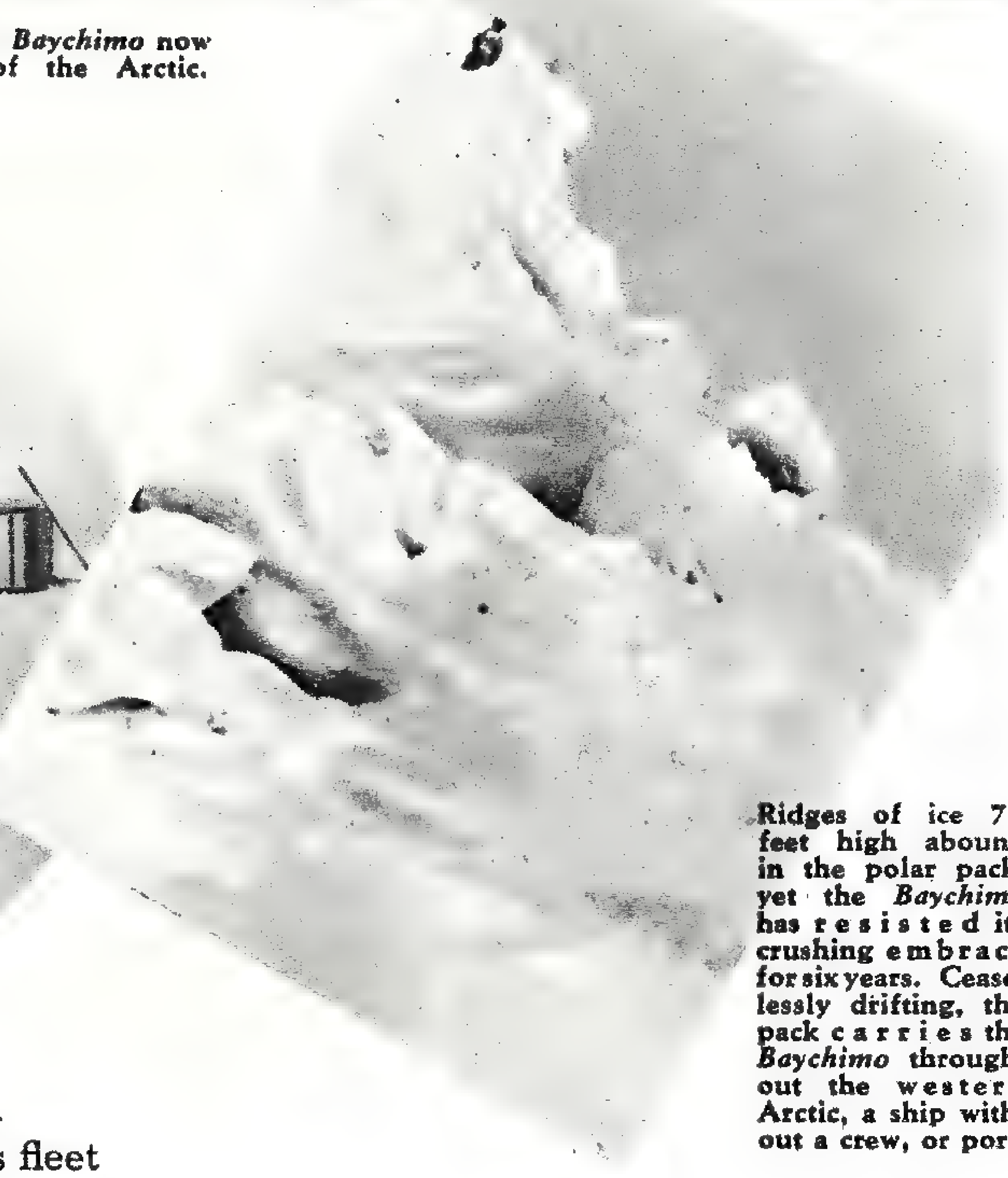
Ghost Ship Sails Arctic



Locked in the relentless icy grip of the polar pack, the *Baychimo* now drifts aimlessly year after year, a ghost ship of the Arctic.



When Capt. Cornwall and his crew abandoned the *Baychimo* in 1931 after removing her million dollar fur cargo, they built a shelter nearby. Next morning the ship had vanished, carried away by the polar pack.



Ridges of ice 75 feet high abound in the polar pack, yet the *Baychimo* has resisted its crushing embrace for six years. Ceaselessly drifting, the pack carries the *Baychimo* throughout the western Arctic, a ship without a crew, or port.

PRIDE of the Hudson Bay Company's fleet in 1922, the *Baychimo,* 1,300-ton steel steamer, navigated the ice filled seas of the Arctic regions for nine successive years without accident. Then, in 1931, a blinding gale locked her in the polar pack to be abandoned by her crew.

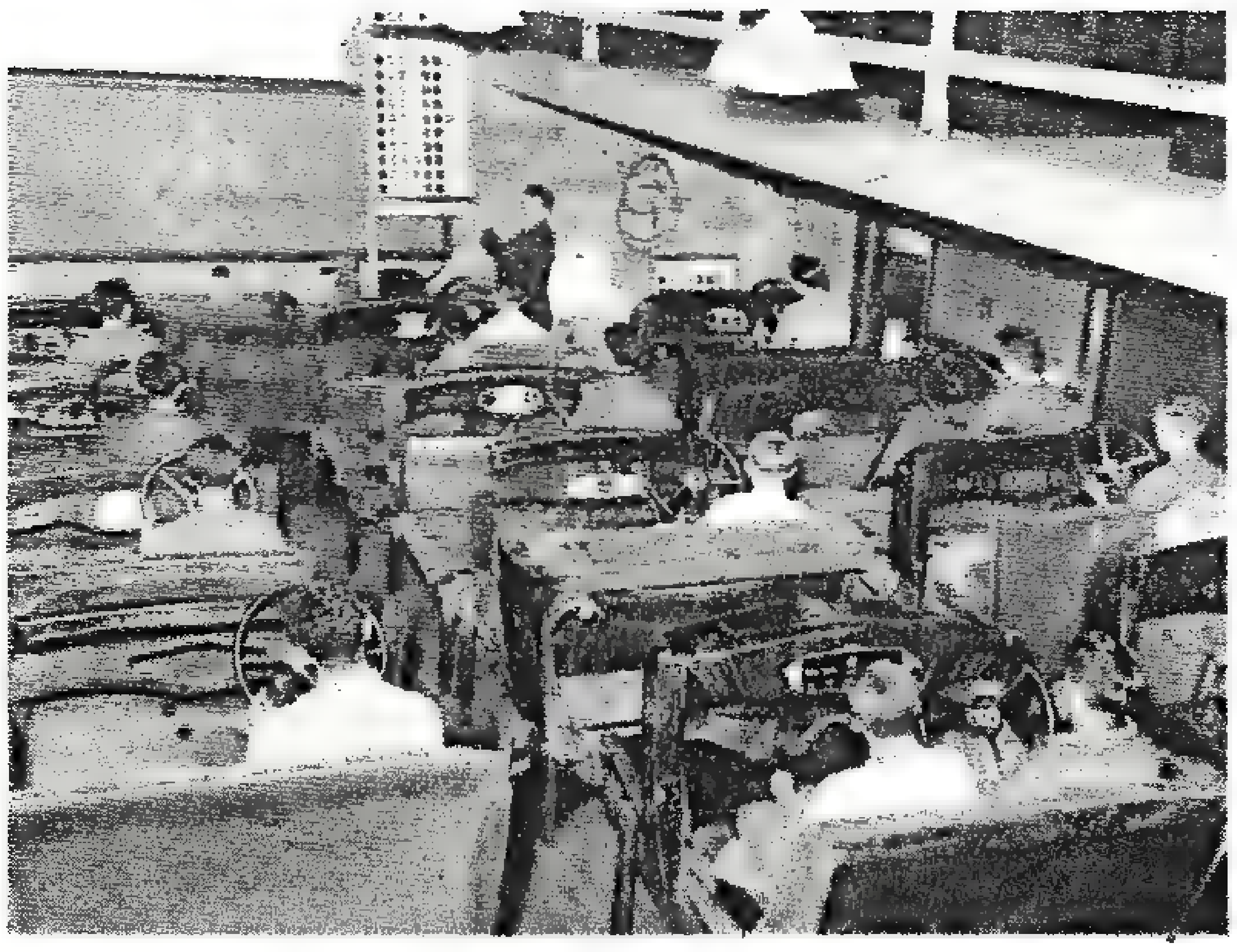
Never before had an abandoned ship escaped being crushed in the ice for more than two seasons, yet, for years since she has been sighted, drifting northward with the polar pack. In 1933, the *Baychimo* was boarded by Captain Polson, of the schooner *Trader,* and found in good condition except for her propeller which had been carried away.

As late as 1936 the ghost ship still appeared, drifting aimlessly.

Obsolete Autos Utilized To Teach Safe Driving

A NOVEL and practical way of training high school students to be safe drivers has been developed at the Lane Technical School in Chicago, Ill. Obsolete autos are cut down until only the driver's seat, brake, clutch and shifting lever controls remain. These are used as desks by the students.

The controls are wired to lamps mounted on a panel in the classroom which enables the instructor, William A. Sears, to check each student's reaction to traffic situations flashed onto a motion picture screen. After this primary instruction, the students drive real cars over a $35,000 practice course featuring every type of lane, curve, grade, etc.



Lane Technical School students in Chicago, Ill., are taught how to drive on dummy cars. Controls wired to lamp panel enable W. A. Sears, instructor, to check student's reaction.

Harpoon-Rifle Spears Fish

This young lady is demonstrating a harpoon-rifle invented by W. M. Edwards, of Miami, Fla. Powered by rubber bands, it shoots arrow into fish which is then retrieved by reel and line.

POWERED by stout rubber bands, a home-made harpoon-rifle invented by W. M. Edwards, of Miami, Florida, actually spears fish. A slender arrow is tied to the line of a fishing reel under the rifle barrel. Steel springs in the muzzle prevent the arrow from slipping into the water when the gun is aimed.

Highway Device Counts Cars

AN ELECTRIC eye device designed for highway use automatically counts the number of autos passing a given point and records days, hours and minutes. In addition, it prints a running total once every hour together with the time at which the count is printed.

The apparatus, invented by the International Business Machines Corp., N. Y. City, consists of two main sections. One contains photo-electric tubes and two receiving lenses. The other section contains two light sources which are positioned at opposite sides of the road. Infra-red filters render the light beams practically invisible to the naked eye, thereby eliminating any possibility of annoyance to motorists. Pedestrians passing the light beams have no effect on the counting apparatus. State highway bureaus use the device for traffic checking purposes.

Placed along a highway so passing autos intercept its light beams, this device automatically counts each car and prints a total once every hour. Passing pedestrians do not effect it.

FIGHTING

LIKE a roaring cyclone, a 75,000,000 cubic foot gas well three miles off shore in Lake Maracaibo, famous Venezuela oil region, prematurely blew in wild and caught fire, a huge weaving 200-foot torch blazing out of the water.

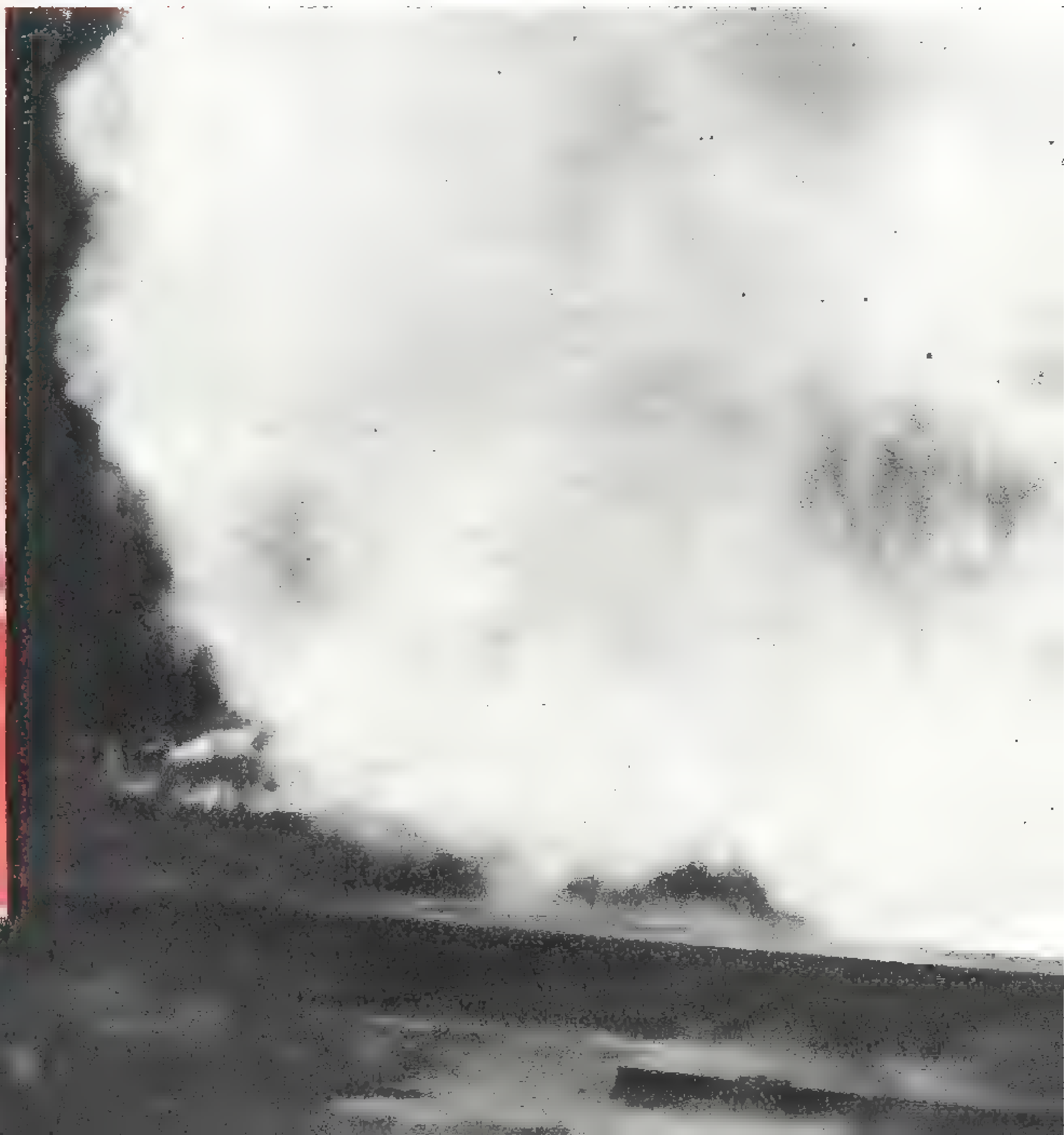
The raging fury offered a problem local engineers could not solve. Capping a wild gasser on land is difficult enough, but one out in the water had even the experts stumped. In the excitement someone thought of Myron M. Kinley, oil well fire fighter of Houston, Texas.

"Get Kinley!" is the cry in the oil fields of the world when anything goes wrong and fire breaks out. Immediately the radio spluttered an SOS to Kinley, and a few hours later he and his brother, Floyd, of Tulsa, Oklahoma, were on their way by plane to tame the wild geyser, which belonged to the Largo Petroleum Co., a subsidiary of Standard Oil.

While the brothers were enroute the big gasser unexpectedly turned into a 6,000-barrel oil well and, of course, blazing. This changed the problem.

When the Kinleys reached Maracaibo and saw what they had to tackle they decided that

Oil well blazing in Lake Maracaibo, Venezuela, with flames shooting 200 feet in air (left); below, the Kinley brothers, in asbestos suits, pull out hot metal to prevent fire recurring after flames are extinguished by "bombs."



OIL WELL FIRES

Going to work in asbestos suits, daredevil flame-eaters are happily at home in the raging infernos of Nature gone wild, and danger only adds zest to their lives.

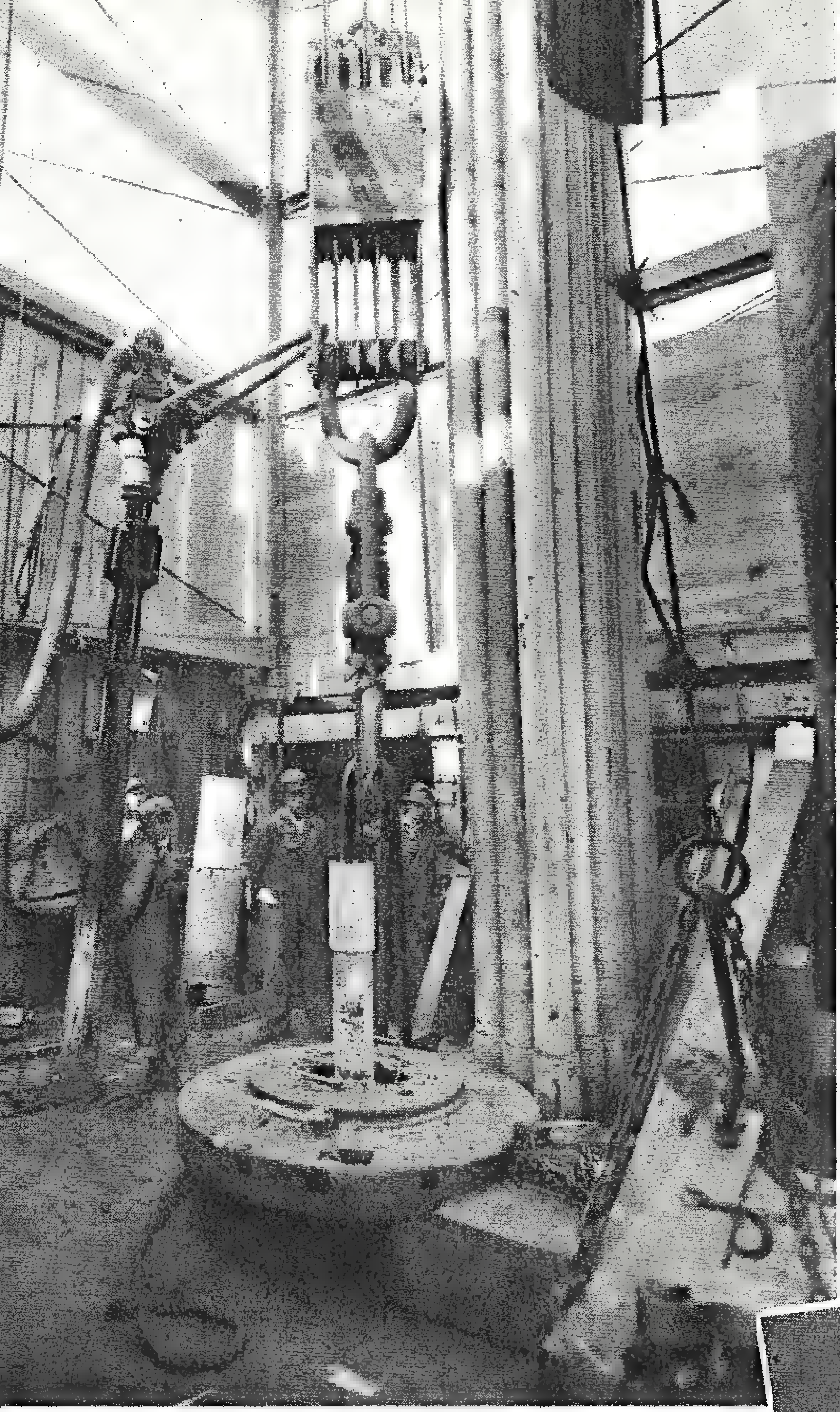
by Gerald F. Benedict

the only thing to do was to let the well burn while they devised a way to stop it. What they did amazed engineers and, when it was all over, even the Kinleys were surprised themselves at their success.

Picking up a huge 94-foot, 25,000-pound derrick in a single piece, they towed it intact on three barges to a spot 600 feet from the blazing well. Then they drilled an offset well, slanting to the base of the blaze. Tapping the oil sand at the bottom and pumping mud and water at the base of the fiery geyser, they automatically shut off the flow of oil.

Next the Kinleys placed a special cap, set in cement, at the mouth of the well to prevent oil from seeping into the lake when the well was re-opened and placed on production. As the brothers frantically dug into the lake bottom to douse the geyser, there was always the threat that flaming oil would pour onto the surface of the lake, with staggering damage. It had happened once before in the case of another well, and the oil companies were swamped with law suits after the burning oil had traveled over the water to the city of Maracaibo, with a population of more than 100,000, and nearly wiped it out in addition to damaging

Myron M. Kinley, world's most famous oil well fire fighter and (inset) Tex Thornton, another man at home in a roaring inferno.



Derrick floor of a drilling well. Heavy equipment is often blown sky high by premature wells, and in case of fire is molten and must be removed.

a dozen other beach towns along the way.

Their unique fire fighting feat accomplished, Floyd casually admitted that he guessed an entire steel derrick had not before been hauled to the scene by barge.

To this engineers agreed. The usual method of moving rigs of such huge dimensions is to tear them down and rebuild them on the new site. It generally requires a week to tear down and another week to rebuild, but a high powered crew has been known to demolish and re-erect a derrick on land in 48 hours. It would have been next to impossible to do this in water.

Answering long distance fire alarms is nothing new to the Kinleys. They have tamed a hundred oil and gas well fires in American fields, while Myron also has subdued fires in Mexico, the Argentine, Colombia and Roumania. The Venezuela expedition was Floyd's first trip to a foreign field.

Myron Kinley first came into international fame following his successful six months' battle with the world's most famous oil well fire—that of the Standard Oil well in Moreni, Roumania—which burned for 18 months, killing nine men and injuring scores of others before Kinley took charge. Traveling with full equipment by land, sea and air from his office in Houston to Roumania, Kinley made the longest fire run on record—7,000 miles.

Something of the problem confronting Kinley in extinguishing the man-made volcano in Roumania may be imagined if you can visualize a crater 260 feet in diameter at the surface in which a blaze 60 feet wide sends a steady, roaring flame 30 feet over the top of the crater. Developing a temperature of 3,000 degrees Fahrenheit, the fire consumed 250,000,000 cubic feet of gas a day, a supply sufficient to meet the entire domestic needs of Detroit, Michigan, for ten days.

Recalling that job recently, Kinley said: "That fire was the meanest I ever worked on. The well caught fire on May 22, 1929, and burned until November 4, 1931. Tunnels, dug to tap the gas flow from beneath the surface, had caved in and gas seeped through the ground in a wide area and spread the blaze. But it wouldn't have been so bad if we hadn't been delayed so

Floyd Kinley, chief assistant to his famous brother. At right is blazing well in Lake Maracaibo, Venezuela, which the Kinley brothers put out, transporting 25,000-pound steel derrick intact to scene of action, an engineering feat which was unusual in itself.

much by Government red tape. Old World superstitions about fooling with the phenomenon of Nature added to the difficulty. We had to show this and that committee that we could put out fire with explosives. Fear and ignorance played its part. Danger, ingenuity, perseverence and the help of the Lord, according to the Roumanian papers, were combined in extinguishing the blaze. They should have included the King, too, for it was not until the arguments were ended by his decree that we finally were able to get to work.

"After shooting the walls of the crater with innumerable charges which smothered the outer blaze with mud and dirt, we succeeded in installing a 30-foot metal stack in a manner that drew the flames to a central point. Several times after the fire had been snuffed out, it re-ignited from the hot ground and pieces of molten metal we could not remove. When the fire finally was definitely out, we connected the gas flow to the lines of a gasoline plant, and it is still functioning."

But what causes these dread fires? As the well is drilled, casing pipe is inserted to protect the hole from water seepage and cave-ins. When the oil or gas sand is reached, the drilling tools are withdrawn and control valves placed on top of the casing and connected with storage tanks. This is done just before drilling into oil or gas sand because, as a rule, oil or gas does not immediately flow when sand is struck.

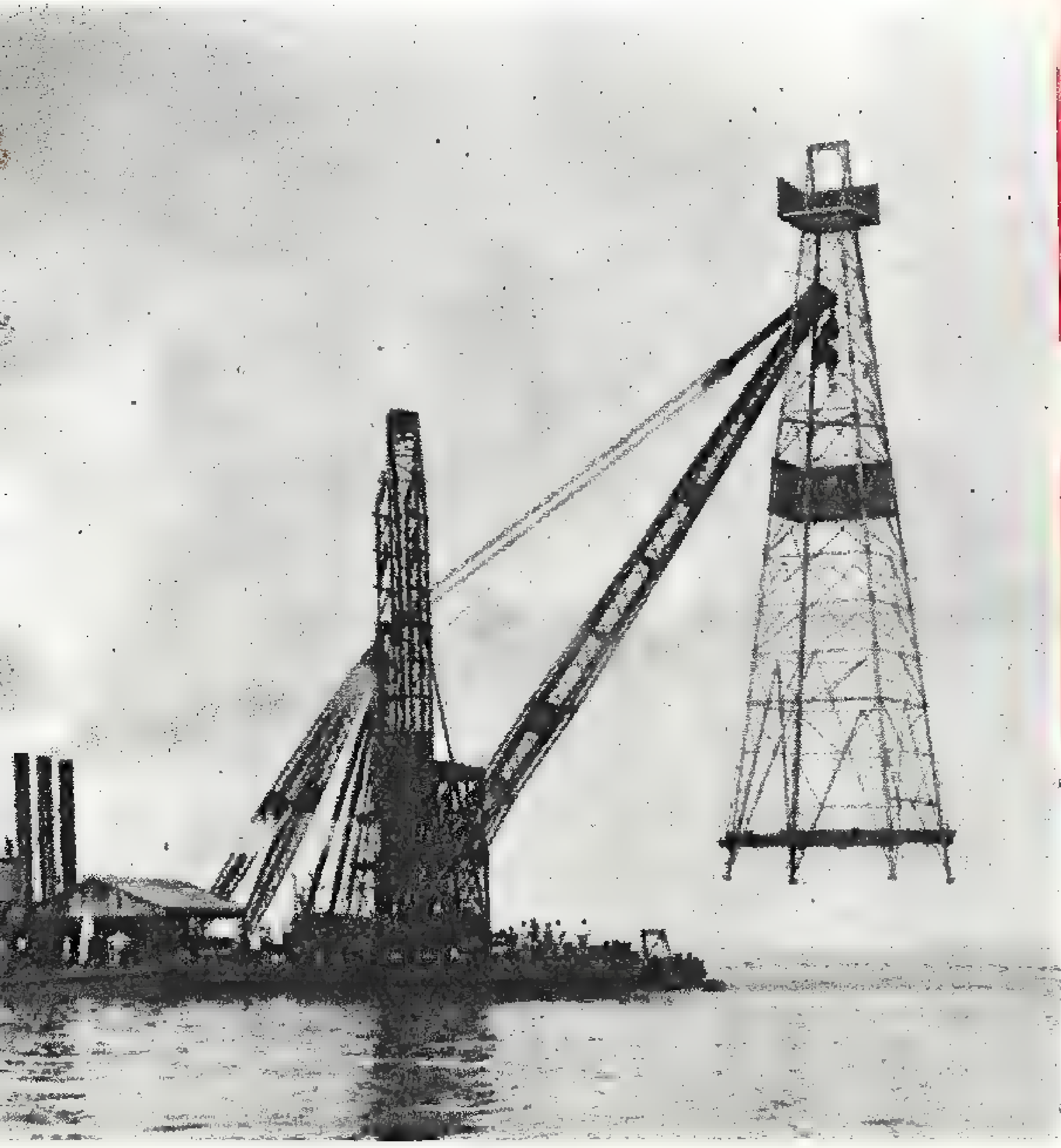
It is the well shooter's job to tap this sand. Oil sand is like a sponge, and may be from three to 150 feet thick. From five to 300 quarts of nitroglycerin are lowered down the casing to the well's bottom and set off. The explosion breaks up the oil sand, so that it releases the oil much as a soaked sponge releases water when pressed. Gas pressure pushes the oil to the surface and, as the oil comes up, the valves are adjusted and the well becomes a producer.

However, there are times when wells come in prematurely, without the need of explosives and before the tools are out of the shaft or the valves installed. It is not unusual for drilling tools, weighing tons, to be blown through the top of a 120-foot derrick by the gas, which often reaches a pressure of 3,000 pounds to the square inch.

This, of course, means the well is out of control, and there is always the threat of fire which may instantly reach a temperature of from 300 to 3,000 degrees Fahrenheit, burning the derrick like a paper bag in a furnace and reducing the steel and iron equipment to a glowing mass of metal.

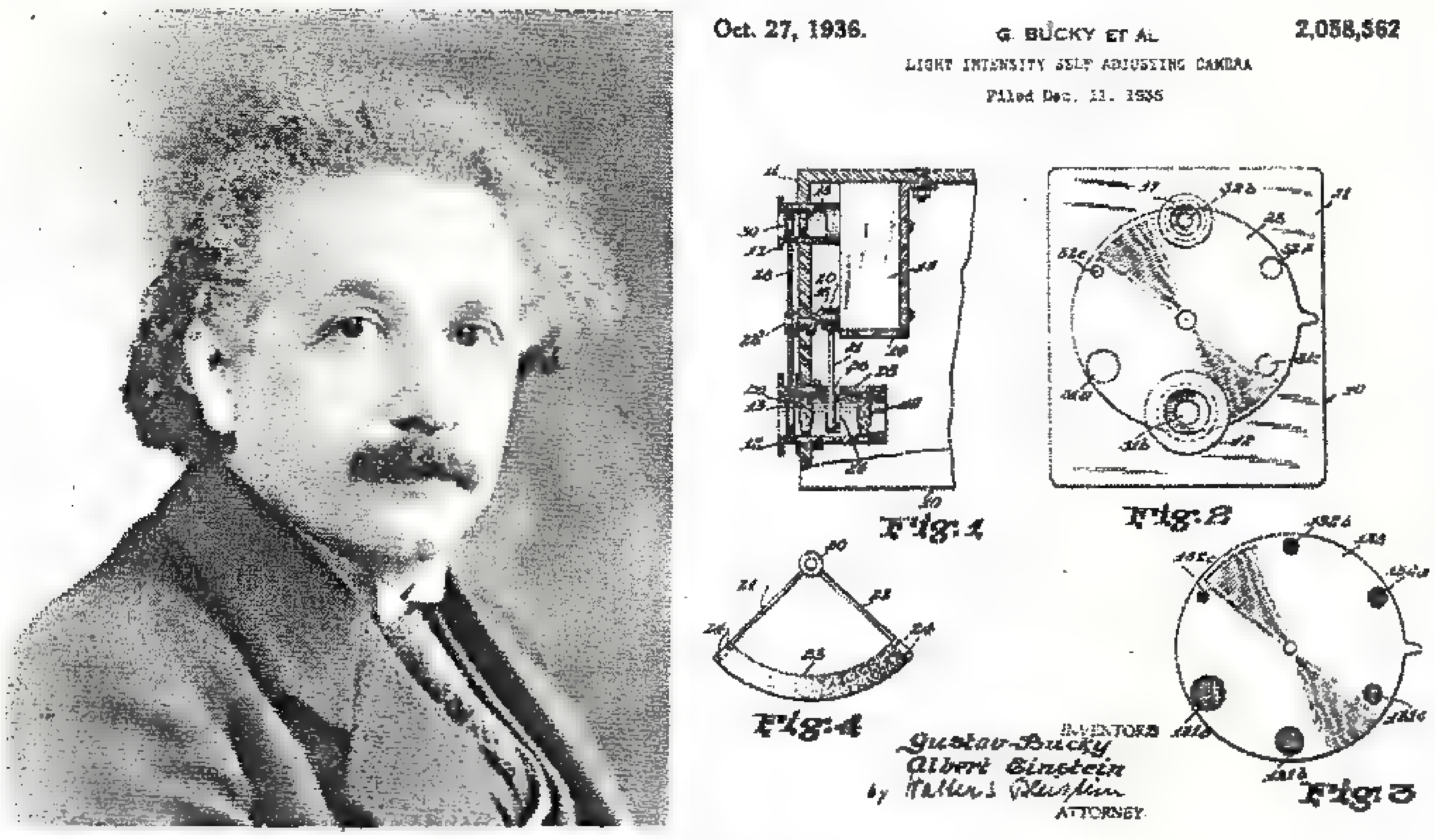
Oil well fires can be caused in a number of

[*Continued on page* 118]



This oil well fire in Roumania blazed for 18 months, killing nine men and injuring scores. Myron Kinley, answering the longest fire run on record—7,000 miles—finally put it out after the King cut red tape, gave him a free hand against the superstitious natives and dubious, busybody officials.

Einstein Invents Automatic Electric Eye Camera



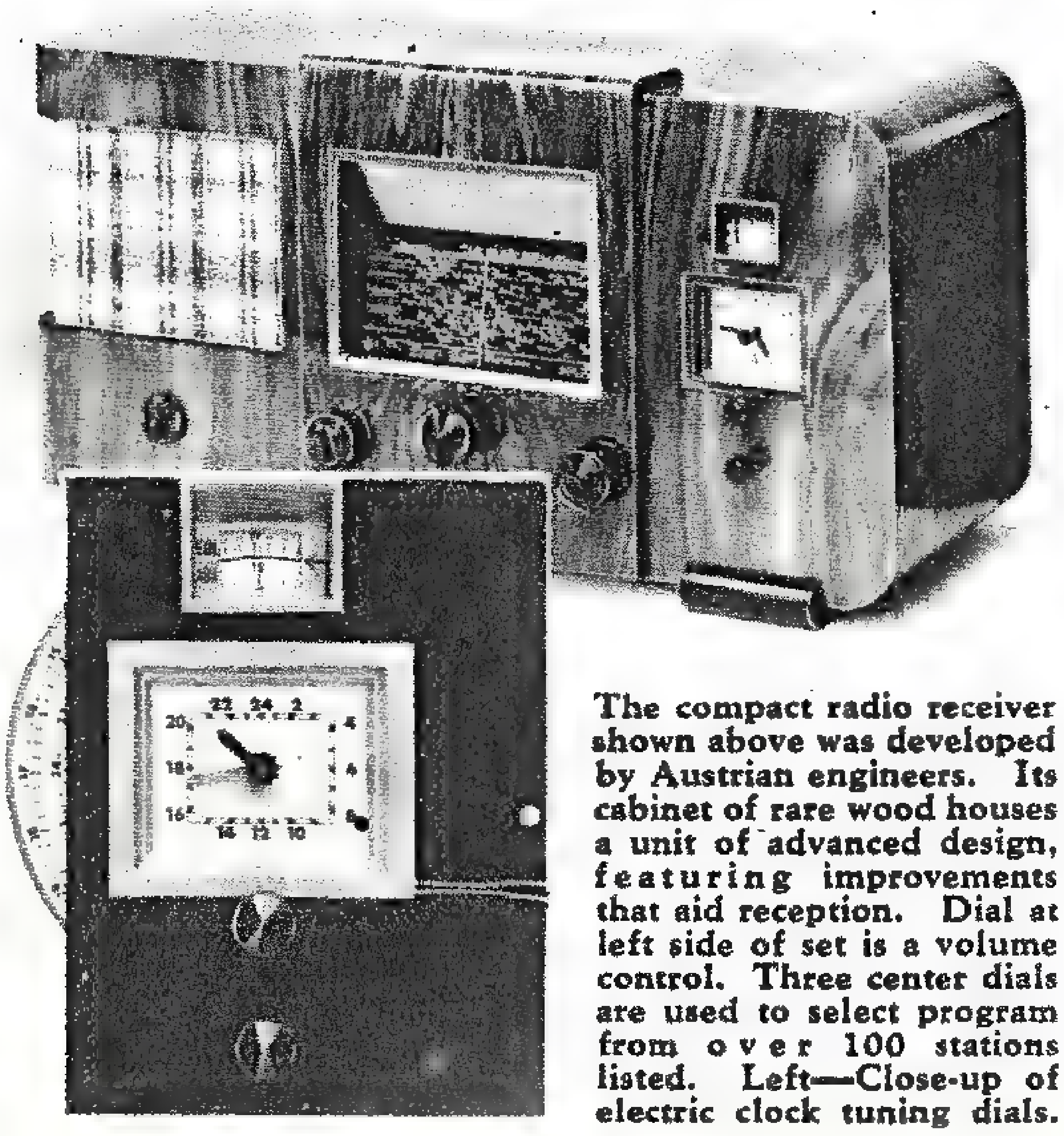
Prof. Albert Einstein, noted physicist, was granted patent, shown above, on a Light Intensity Self-Adjusting Camera. Dr. Gustav Bucky, New York University radiologist, is co-inventor.

PROFESSOR ALBERT EINSTEIN, famed for his theories on relativity and the universe, is a practical inventor as well. The U. S. Patent Office has granted the noted physicist and Dr. Gustav Bucky, consulting radiologist at New York University, who is co-inventor, a patent covering a Light Intensity Self-Adjusting Camera. Professor Einstein also holds British and American patents on improvements in gas-burning refrigerators and Dr. Bucky is inventor of a diaphragm used in X-ray photography. The camera device uses a photo-electric cell which automatically increases or decreases light entering a camera by moving a tiny light filter graduated from zero to complete transparency.

Receiver Has Clock Tuner

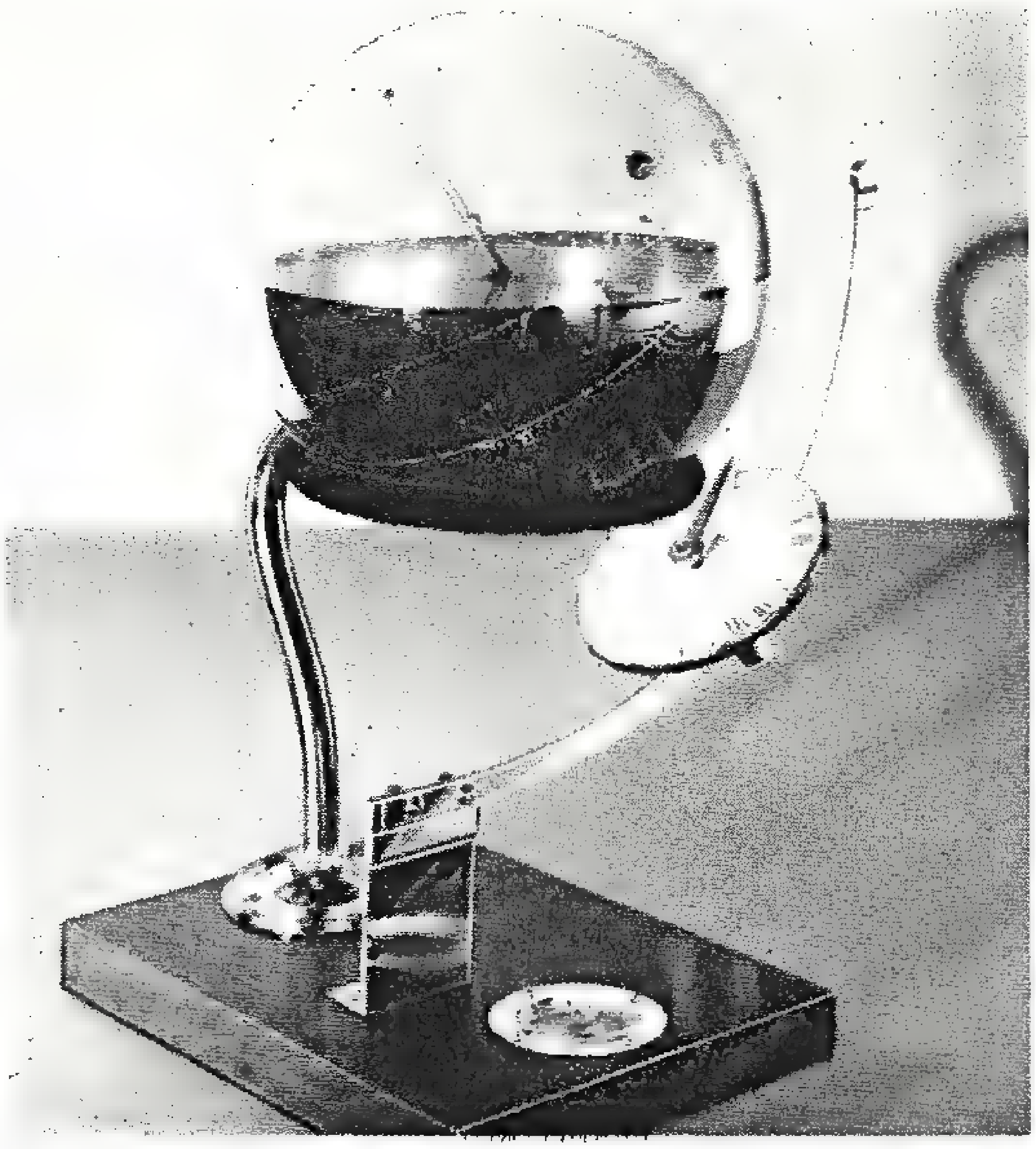
A NOVEL radio receiving set designed by Austrian radio engineers features a clock and dial combination that increases the pleasure and convenience of listening to broadcasts. The cabinet is made of rare wood and is modernistic in appearance.

The small dials on the face of the receiver are connected to the electric clock in such a manner that the set owner can arrange for the set to automatically tune in any desired station at any predetermined time. The tuning dial lists more than 100 local and foreign stations that can be heard with the set. The set resembles typical American receivers in general appearance.



The compact radio receiver shown above was developed by Austrian engineers. Its cabinet of rare wood houses a unit of advanced design, featuring improvements that aid reception. Dial at left side of set is a volume control. Three center dials are used to select program from over 100 stations listed. Left—Close-up of electric clock tuning dials.

Astroglobe Aids Amateurs



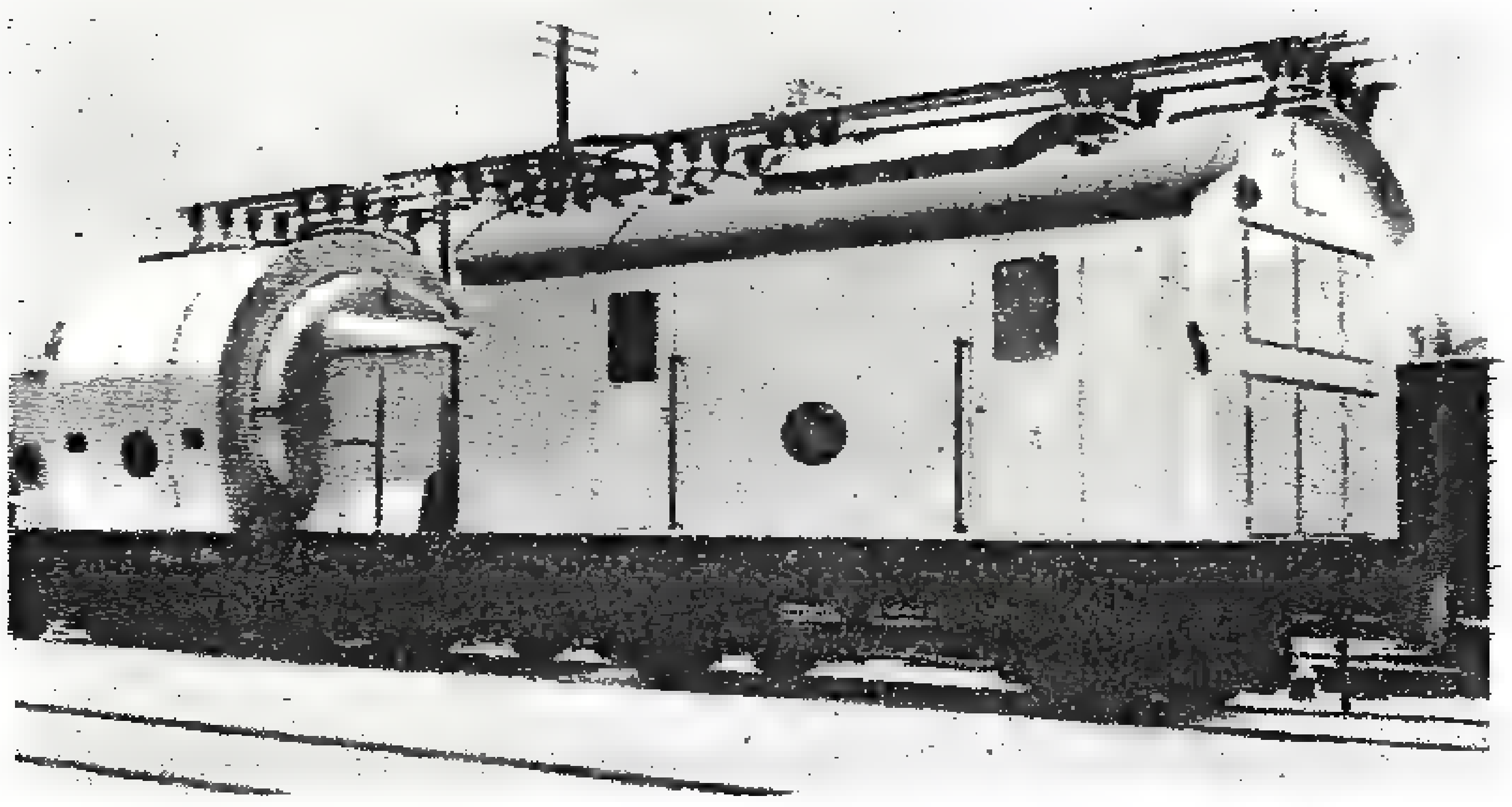
This astroglobe has 24 constellations marked on it. Device rotates every 24 hours to represent motion of celestial bodies around the earth, imagined to be at exact center of globe.

A NEW astroglobe device enables student and amateur astronomers to determine the approximate position of any of the principal constellations for any date, place, or time. It is also possible to ascertain the positions of the planets in their constant orbital movements. K. N. Munro, an amateur astronomer of London, England, is inventor.

Swedish Railways Develop Mobile Power Plants

CARRYING out a policy of electrifying their main lines, the Swedish State Railways have developed, and are putting into service, a number of transportable motor generators. The powerful generators are mounted and housed on specially designed railroad cars.

Current to run the fast Swedish electric trains is generated at a number of water power plants. From these plants it is led to various transforming stations throughout the country. Heretofore, these transformers were of the traditional stationary variety, but the new mobile equipment will replace them. The stationary transformers, however, will be maintained for emergency use.



Replacing the old type of stationary power generating stations, these new type mobile generators will provide current for running the fast electric trains of Sweden's main railways.

Explosive Safe To Handle

A small quantity of a new explosive mangled this steel I beam in tests to determine effectiveness. The explosive is safe to handle, and won't explode even when thrown into a stove. Used in quarries, no time is lost in clearing operations as fumes are unnoticeable.

AN EXPLOSIVE that combines safety in manufacture with greater strength and more efficiency in operation has been developed. The powder does not deteriorate with age and no chemical reaction takes place when it is kept in storage.

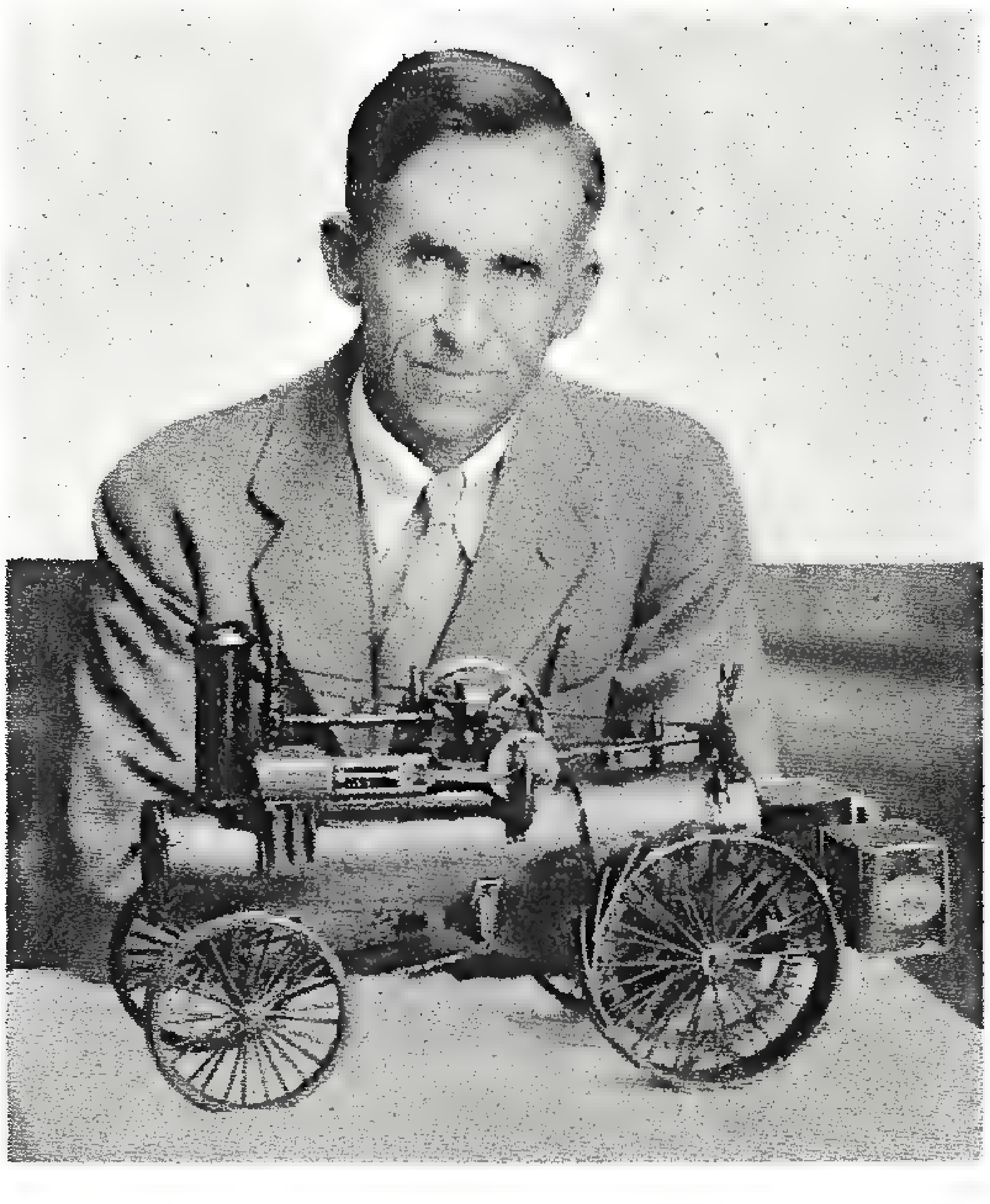
The new powder cannot be exploded by shock, nor by ignition. If struck with a hammer, or if a quantity is thrown into an open stove, it will not explode. It is set off by means of a No. 6 cap of fulminate of mercury and a fuse.

Standard government tests indicate that the new explosive powder has an increased efficiency, gram for gram, over that of nitroglycerin explosives. When used, the powder does not develop noxious fumes.

Steam Traction Model Works

A WORKING model of "Old Betsy," one of the oldest American traction engines, was constructed by L. K. Woods, of Mendon, Utah. The tiny engine is fired with a blow torch until 20 pounds of steam pressure is raised, sufficient to make it run forward or in reverse.

The boiler is made of scrap metal, electrically welded, and can stand 80 pounds pressure. The drive wheels are made of wrought iron with welded rims, wire spokes, turned hub, and lugs riveted on spoke ends. Tin cans are used for fuel boxes.

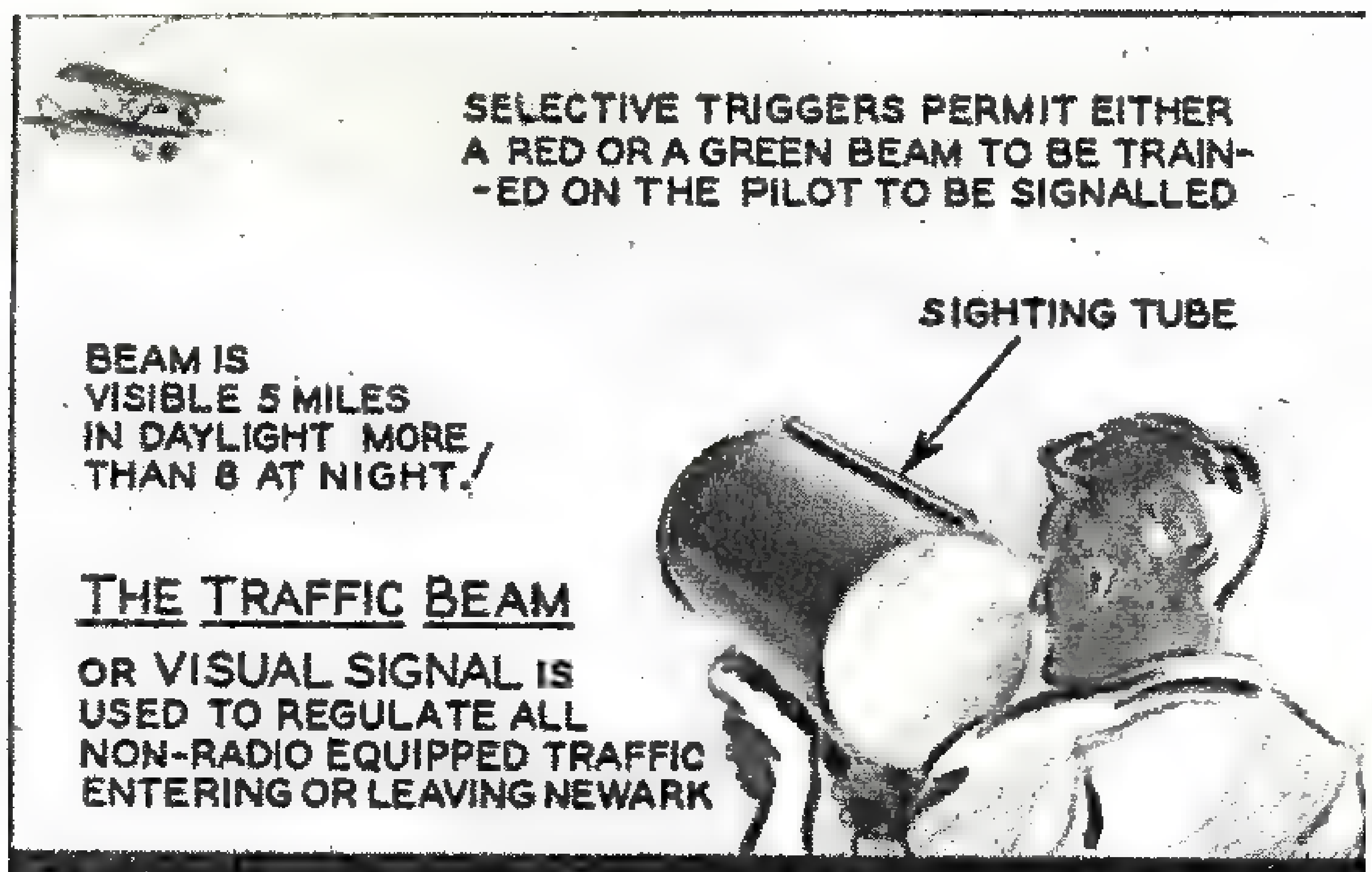


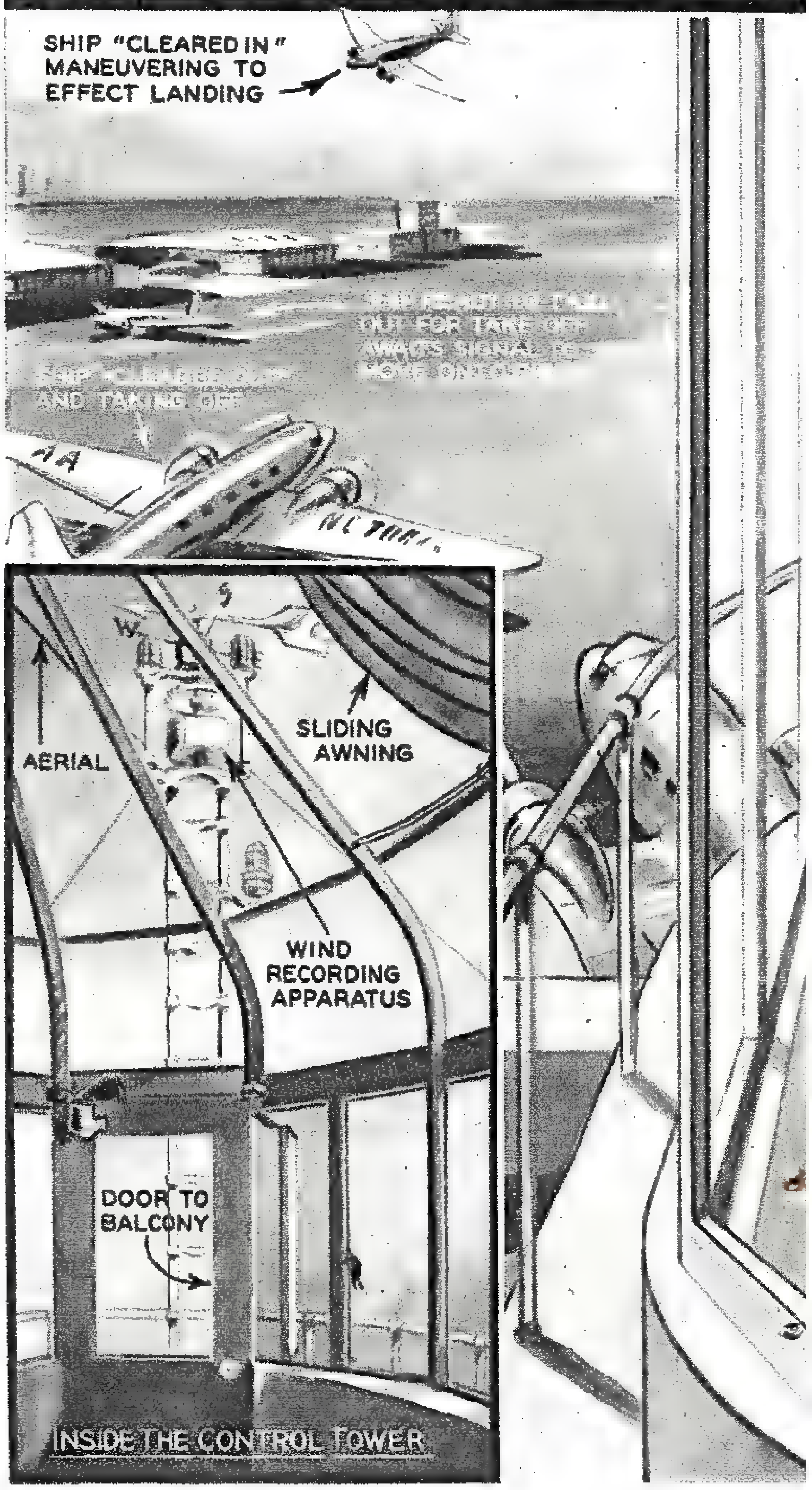
L. K. Woods, of Mendon, Utah, owns the oldest steam traction engine in the Rockies. He built this working model of it which weighs 26 pounds and is 19½" long, 11½" high.

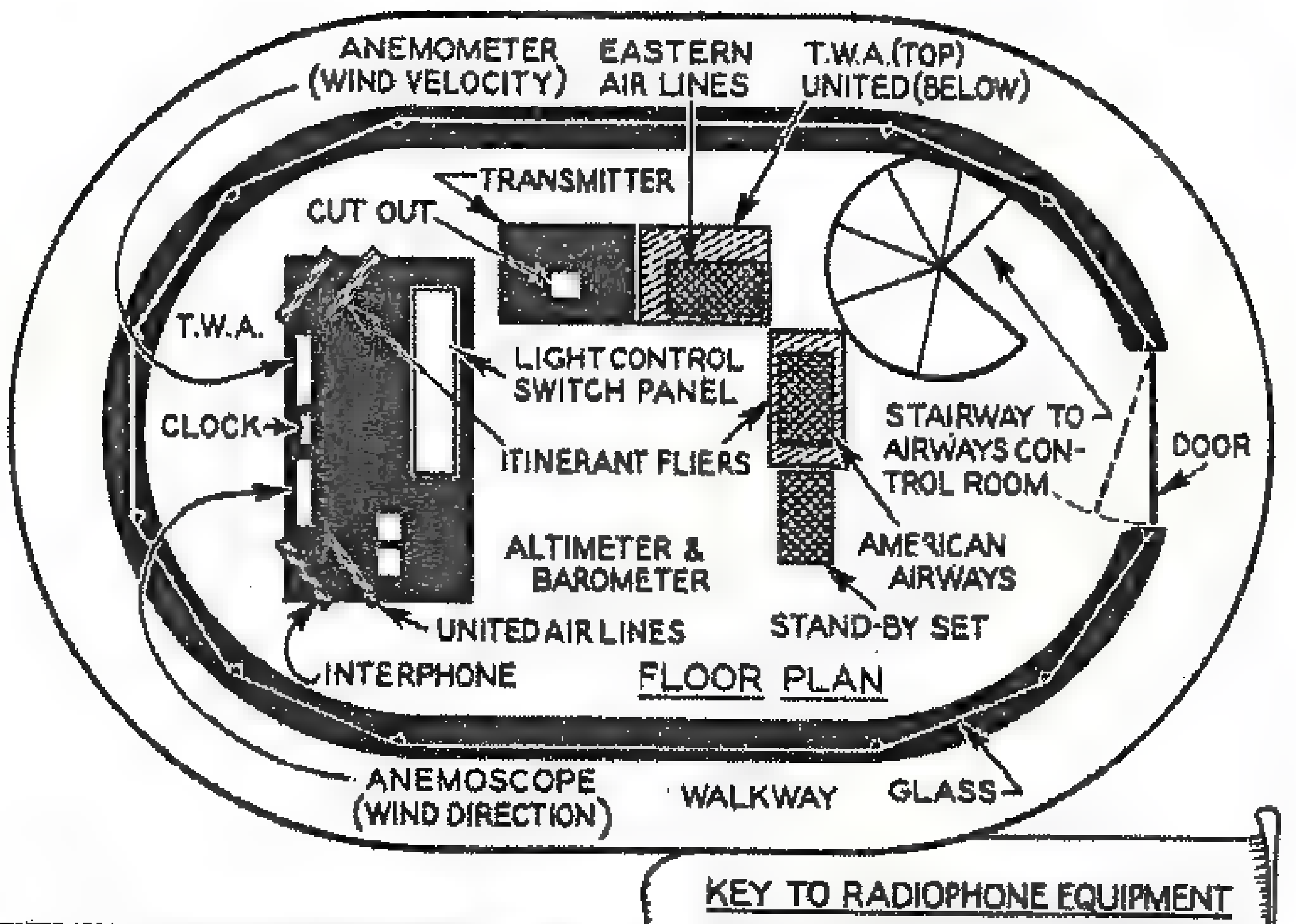
"Hello, Newark—"

"All clear? Can I land?" Hundreds of times daily the Newark Airport Controller must answer these radiophone questions from pilots.

by Douglas Rolfe


SELECTIVE TRIGGERS PERMIT EITHER A RED OR A GREEN BEAM TO BE TRAINED ON THE PILOT TO BE SIGNALLED
SIGHTING TUBE
BEAM IS VISIBLE 5 MILES IN DAYLIGHT MORE THAN 8 AT NIGHT.
THE TRAFFIC BEAM
OR VISUAL SIGNAL IS USED TO REGULATE ALL NON-RADIO EQUIPPED TRAFFIC ENTERING OR LEAVING NEWARK

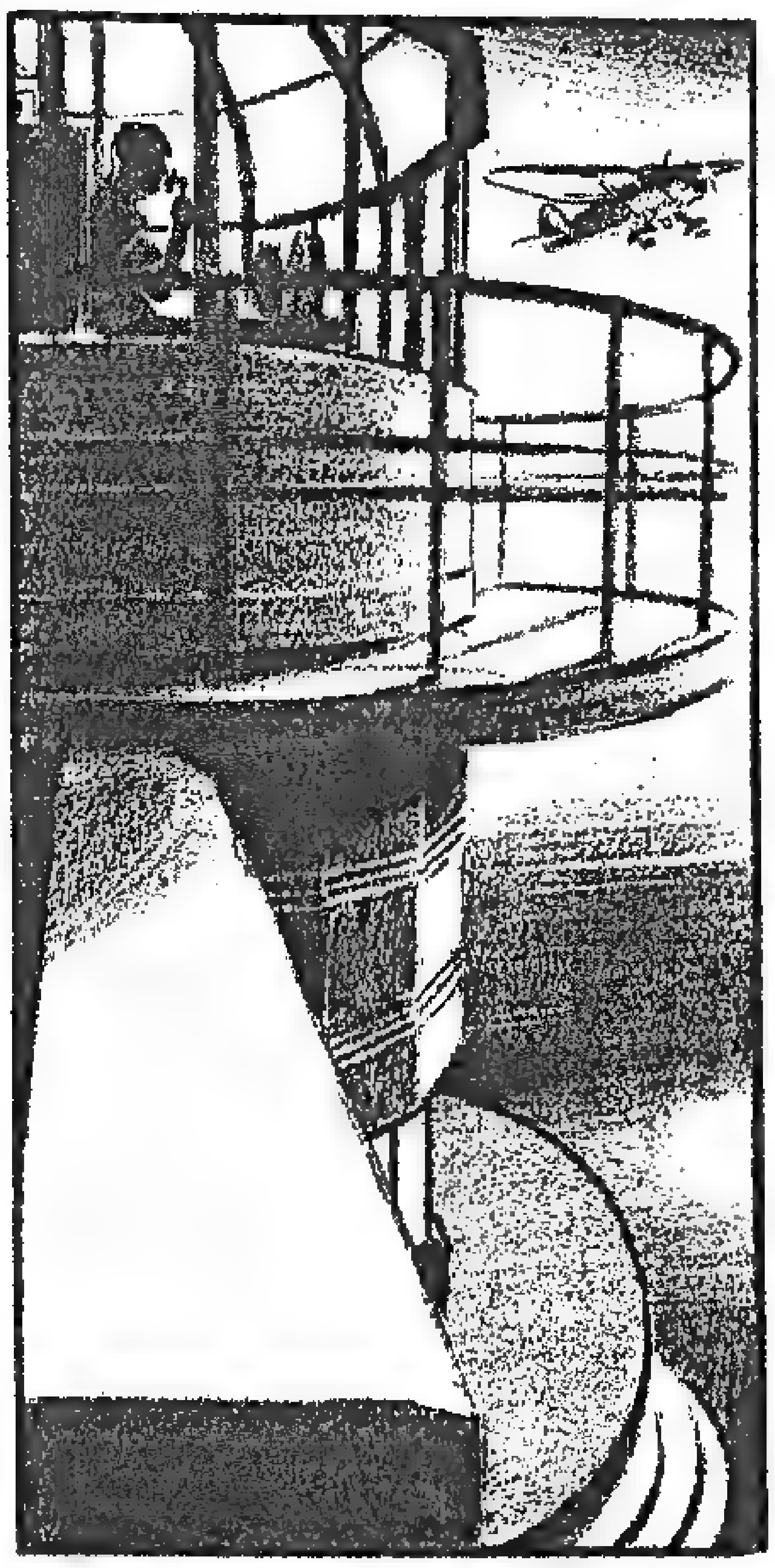

SHIP "CLEARED IN" MANEUVERING TO EFFECT LANDING
OUT FOR TAKE OFF
AND TAKING OFF
AA
NC 7O
AERIAL
SLIDING AWNING
WIND RECORDING APPARATUS
DOOR TO BALCONY
INSIDE THE CONTROL TOWER


ANEMOMETER (WIND VELOCITY)
EASTERN AIR LINES
T.W.A.(TOP) UNITED(BELOW)
TRANSMITTER
CUT OUT
T.W.A.
CLOCK
LIGHT CONTROL SWITCH PANEL
ITINERANT FLIERS
STAIRWAY TO AIRWAYS CONTROL ROOM
DOOR
ALTIMETER & BAROMETER
AMERICAN AIRWAYS
UNITED AIR LINES
STAND-BY SET
INTERPHONE
FLOOR PLAN
ANEMOSCOPE (WIND DIRECTION)
WALKWAY
GLASS

KEY TO RADIOPHONE EQUIPMENT

RECEIVING SETS ONLY... ▨
SEPARATE SPEAKERS ▤
SPEAKERS ATTACHED ▩

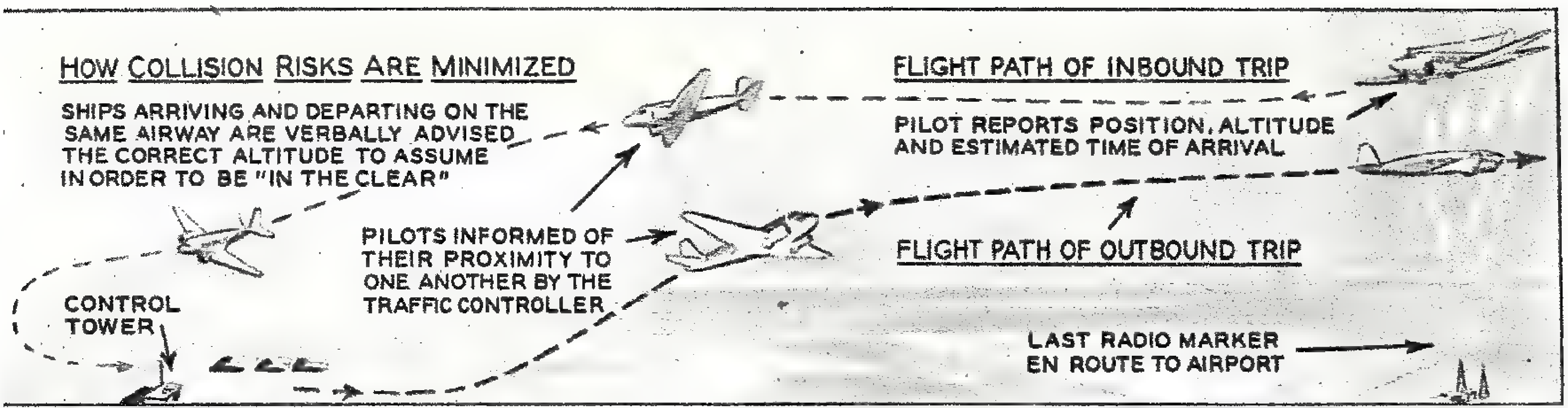
Above—Floor plan of Traffic Control Tower showing layout of the equipment. Left—From the tower, the Traffic Controller has an unobstructed view of the sky and field. He contacts all planes.

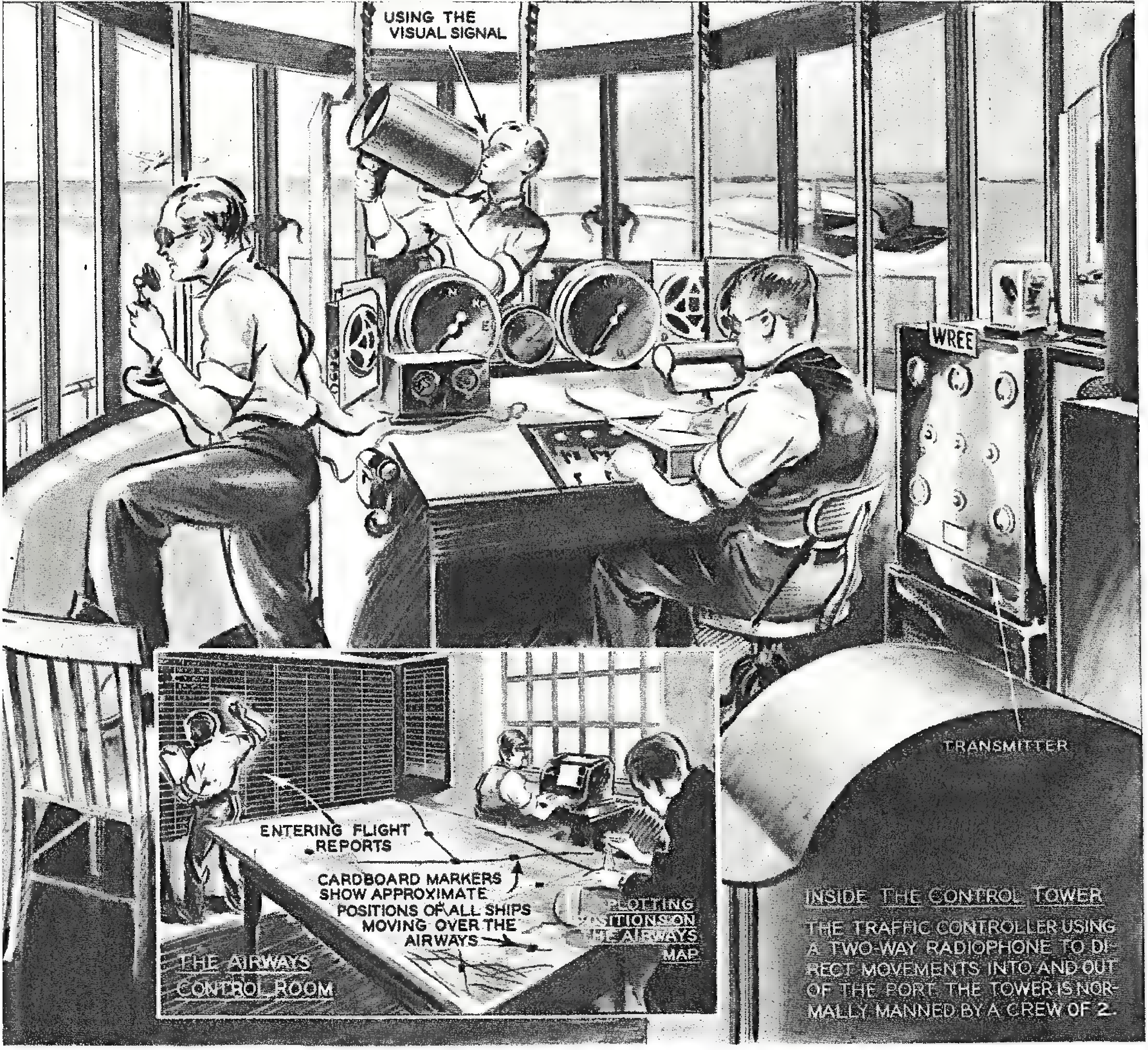


The base of the Traffic Control Tower forms the Airways Control Room. Charts showing position of planes en route are plotted every 15 minutes.

NEWARK AIRPORT—busiest air terminal in the United States, if not the entire world—is equipped with every device known to science for the efficient control of air traffic. The huge air liners of the United, TWA, American Airways, and Eastern Air Lines are enabled to arrive and depart with a maximum of safety and minimum loss of time. Itinerant private and commercial planes are also efficiently controlled at this most modern airport.

A small glass enclosure atop the Administration Building houses the Traffic Controller and his assistant who have an unobstructed view of the field and sky in every direction. Two


HOW COLLISION RISKS ARE MINIMIZED
SHIPS ARRIVING AND DEPARTING ON THE SAME AIRWAY ARE VERBALLY ADVISED THE CORRECT ALTITUDE TO ASSUME IN ORDER TO BE "IN THE CLEAR"
FLIGHT PATH OF INBOUND TRIP
PILOT REPORTS POSITION, ALTITUDE AND ESTIMATED TIME OF ARRIVAL
PILOTS INFORMED OF THEIR PROXIMITY TO ONE ANOTHER BY THE TRAFFIC CONTROLLER
FLIGHT PATH OF OUTBOUND TRIP
CONTROL TOWER
LAST RADIO MARKER EN ROUTE TO AIRPORT

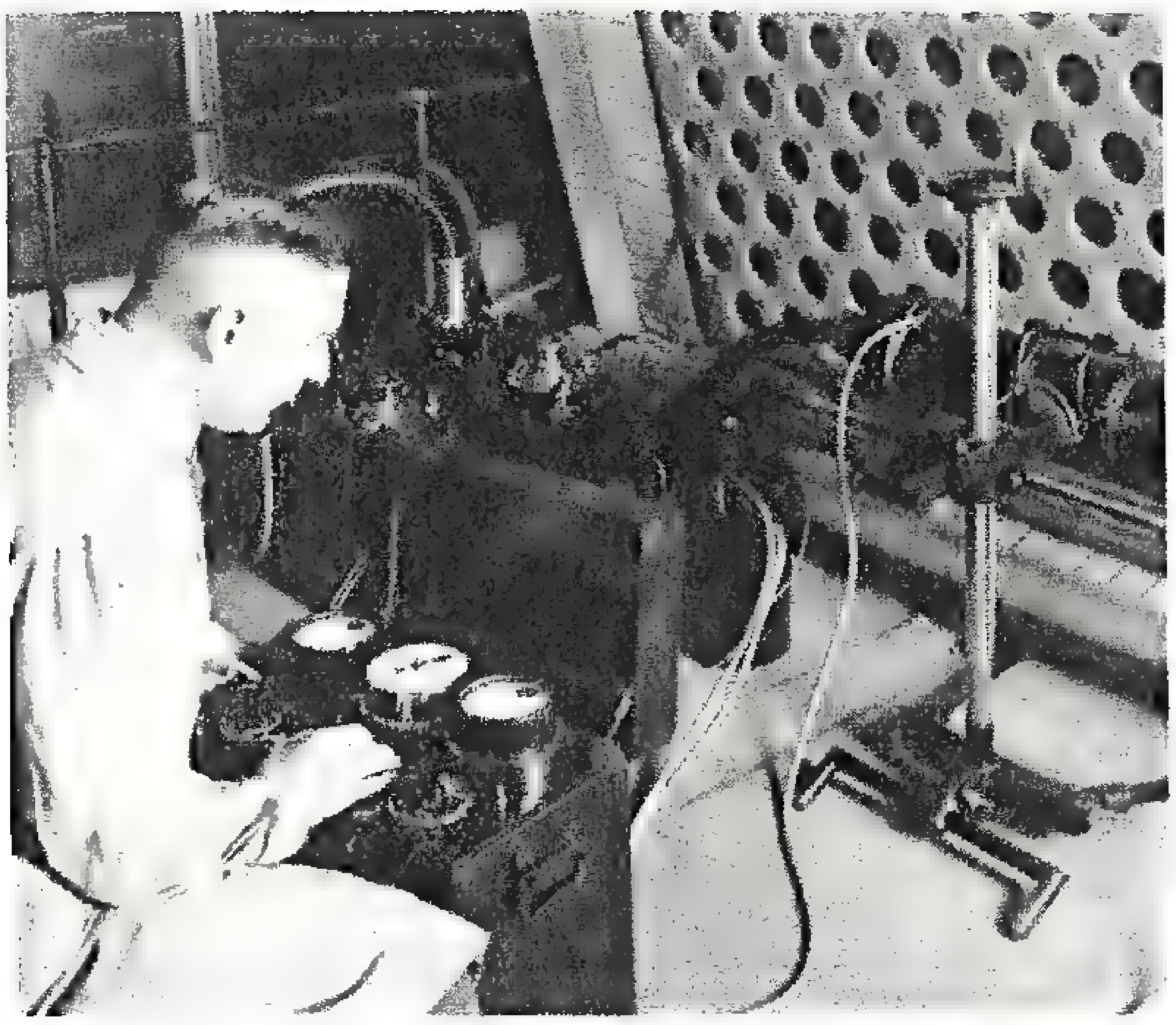

USING THE VISUAL SIGNAL
WREE
TRANSMITTER
ENTERING FLIGHT REPORTS
CARDBOARD MARKERS SHOW APPROXIMATE POSITIONS OF ALL SHIPS MOVING OVER THE AIRWAYS
PLOTTING POSITIONS ON THE AIRWAYS MAP
THE AIRWAYS CONTROL ROOM
INSIDE THE CONTROL TOWER
THE TRAFFIC CONTROLLER USING A TWO-WAY RADIOPHONE TO DIRECT MOVEMENTS INTO AND OUT OF THE PORT. THE TOWER IS NORMALLY MANNED BY A CREW OF 2.

The Traffic Controller at Newark Airport uses radiophone and light beams to direct air traffic. Planes are advised when to land or take off. Pilots without radio equipment are advised by red or green light beams directed at plane.

men are on duty night and day. An Airways Control Room is located in the base of the Traffic Controller's tower. Here, the radiophone reports from planes en route are received and charts showing the approximate position, speed, and altitude of every plane in transit are plotted at 15 minute intervals.

Incoming planes radio their approach to the field and the Traffic Controller, informed by the "AC" room as to the nearness of other approaching planes, radios back directions as to what altitude to approach the field at, weather conditions, direction of wind, etc. Approaching the field at the specified altitude, the pilot soon receives a message that the field is "clear" and a landing can be made. Outgoing planes are informed as to when they can take off and what altitude must be reached before a turn onto the desired course is permissible. Collision danger is eliminated.

Compact X-Ray Apparatus Aids German Industry



Through the use of this newly developed compact X-ray apparatus with its 450-watt tube, German industrial plants detect hidden flaws in their raw materials or finished products.

AN EFFICIENT small X-ray machine has been developed by German laboratory technicians to aid industrial plants in detecting flaws in their raw materials and finished products which are not discernible by ordinary inspection methods. To operate the apparatus it is only necessary to plug it to any convenient lighting socket.

Red signaling lamps indicate when the machine has been turned on. Any disturbance of the usual smooth running of the device causes a rise in temperature which, through a thermostatic control, causes a loud horn to sound. Because the machine generates considerable heat while operating it was necessary to insure proper cooling by running water coils through the oil-box that lubricates the apparatus.

The compact machine was designed with maximum consideration to the factors of good conductivity, short exposure period, adaptability, safety and simplicity, as well as to the problem of small space requirements.

Tiny Aero-Radio Developed

DESIGNED for aircraft use, a new radio receiver weighs only 5¾ pounds as compared with the average aircraft radio's weight of 30 pounds. It operates on the 12-volt current of the airplane's battery and is said to have ample range even under adverse conditions.

Developed by a Tulsa, Okla., radio firm, the receiver has two ranges of reception. One, for receiving government weather reports and flying beam broadcasts, and the other for ordinary reception.

Above—After two years of experimenting, these Tulsa, Okla., engineers produced an aircraft radio that weighs only 5¾ lbs. (Left to right)—Serge Scherbatskoy, W. L. Ducker, W. G. Green, and Lt. W. B. Trundle. Left—Close-up of set.

Classes Held In R. R. Cars

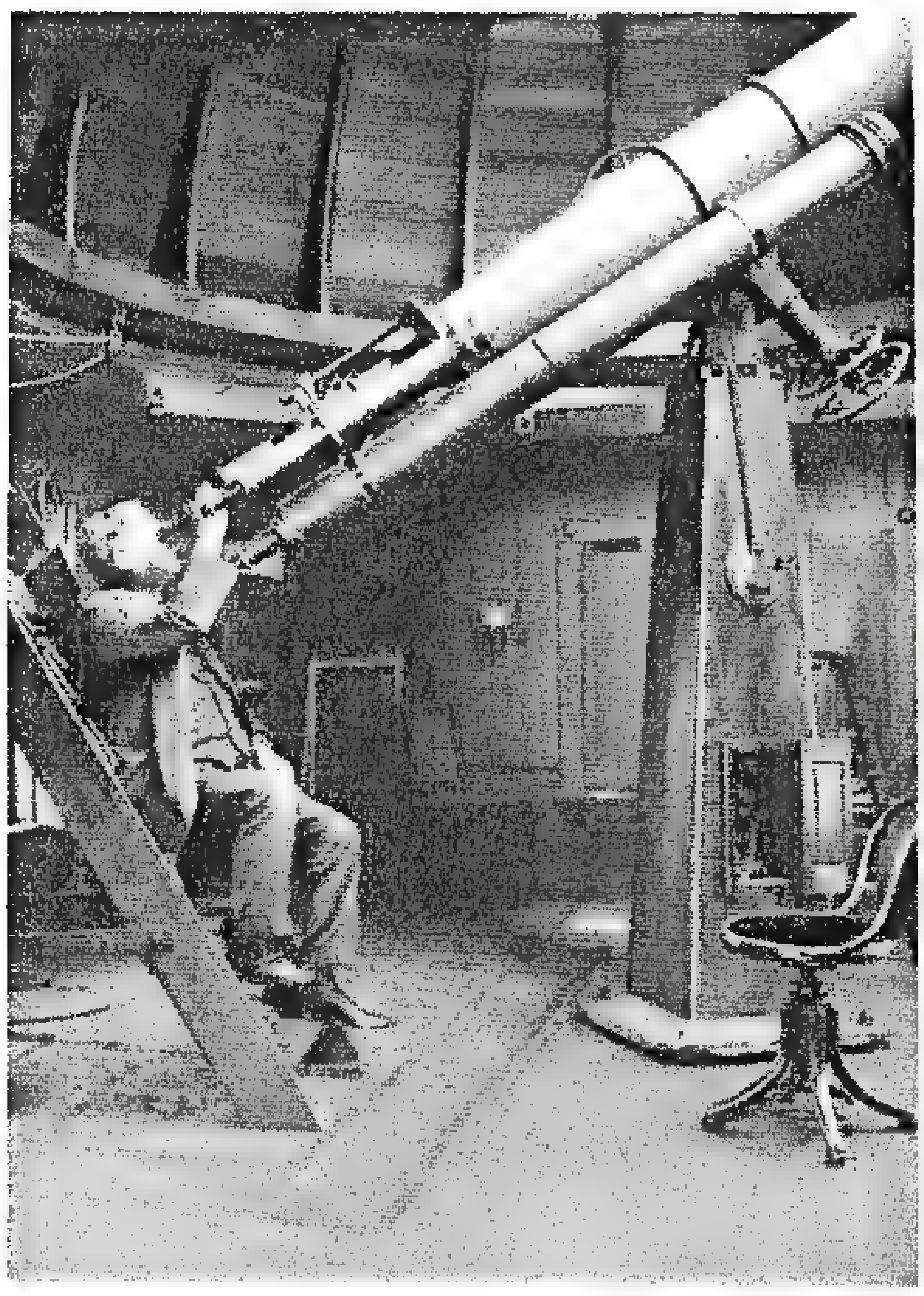
Passenger coaches loaned by the Great Northern and Northern Pacific Railways were fitted up as science laboratories and classrooms when an earthquake ruined Helena, Mont., school.

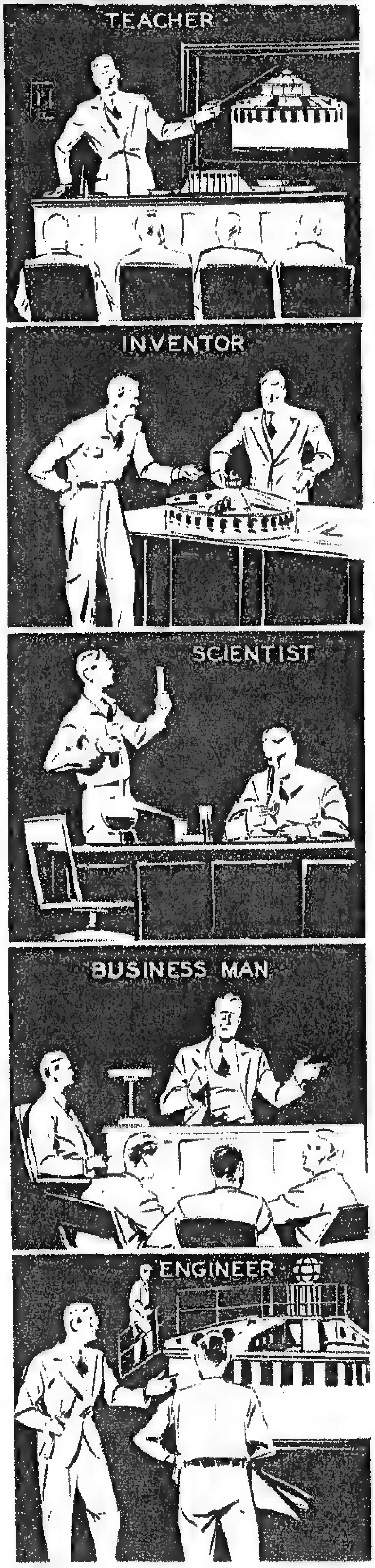
MORE than 1,000 high school students in Helena, Mont., are attending classes held in 18 passenger coaches of the Great Northern and Northern Pacific Railway. The coaches were loaned to the school authorities after an earthquake had ruined the school.

The cars were placed on a siding and a central plant for heating the entire group was devised. In most of the coaches, the students use the familiar plush seats, but in cars used for science and other classes requiring laboratory equipment the seats were replaced with tables, racks, etc.

Dr. Elihu Thomson, Dean of Inventors

by Aubrey D. McFadyen





Quiet Dr. Elihu Thomson is the inventor behind more than 700 patents. To him they are but one of his many side lines as shown at right. Left—His hobby is astronomy. He calls himself an "amateur," but astronomers disagree.

This is the first of a series of articles on the leading American inventors of our time. Next month Dr. Miller Reese Hutchinson will be introduced in these pages.

DR. ELIHU THOMSON, the revered "dean of American engineers," is one of the truly great pioneers in the field of electricity; but he is no less truly a pioneer in pure science. He is a person of international renown, for his influence, like that of all great intellects, transcends the boundaries of nations, and will endure beyond the calendars of the years.

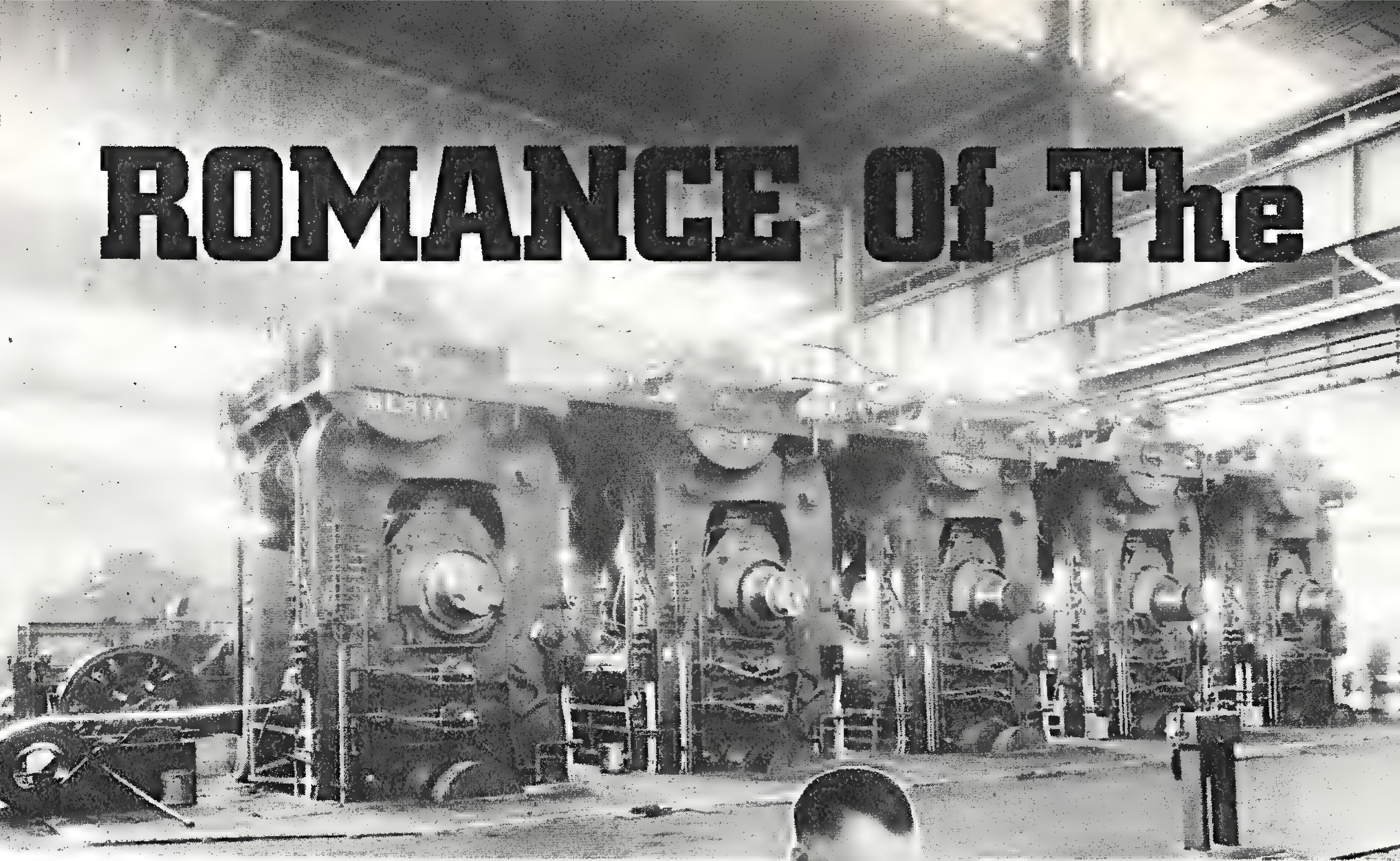
Although Elihu Thomson has won fame as scientist, inventor, organizer, engineer, and man of business, the world still regards him as a school teacher. For over sixty years the title of "professor" has been affectionately associated with his name. He is, in fact, by temperament and attitude the ideal teacher—unfailingly patient, mentally magnetic, in personality endearing.

Elihu Thomson's education was gained from the public schools of Philadelphia, graduating from Central High School there in 1870. For ten years immediately following his graduation he taught in the same institution. At first Prof. Thomson taught chemistry and physics. But electricity gradually lured him from these first loves. In his spare time he studied electricity by himself. Later he began teaching this subject to night classes in the Philadelphia schools, as well as lecturing at the Franklin Institute.

Ideas began to crowd forward early in the career of this vigorous mind. As a remarkably young high school professor, for he was still in his teens, he advanced the theory, in a series of public lectures, that all forms of electricity are but manifestations of the same thing—at that period a new idea indeed.

[*Continued on page* 126]

ROMANCE Of The



Miles of thin steel sheets being rolled out to be tin-plated and turned into "tin cans" destined to supply the tables of the nation with everything from soup and fish to beer.

CUT all the tin plate used annually to make the tin cans of America into a strip one foot wide and you can wind that strip around the earth fourteen times.

Or, to visualize it another way, take the five billion odd square feet of tin plate into which we put our fruits, vegetables, meat, fish, beer, paint, oil, candy, cheese and tobacco each year and it would be a simple matter to *can the moon.* You'd have the biggest cheese can ever made, and still have a lot of tin plate left over.

The vastness of tin can production has brought this familiar article into the lives of nearly every American family, for it is in this country that the greatest volume of tin cans is produced. A good year will find between eight and nine billion cans for the food racks of this country and this is the business that accounts for the major percentage of cans.

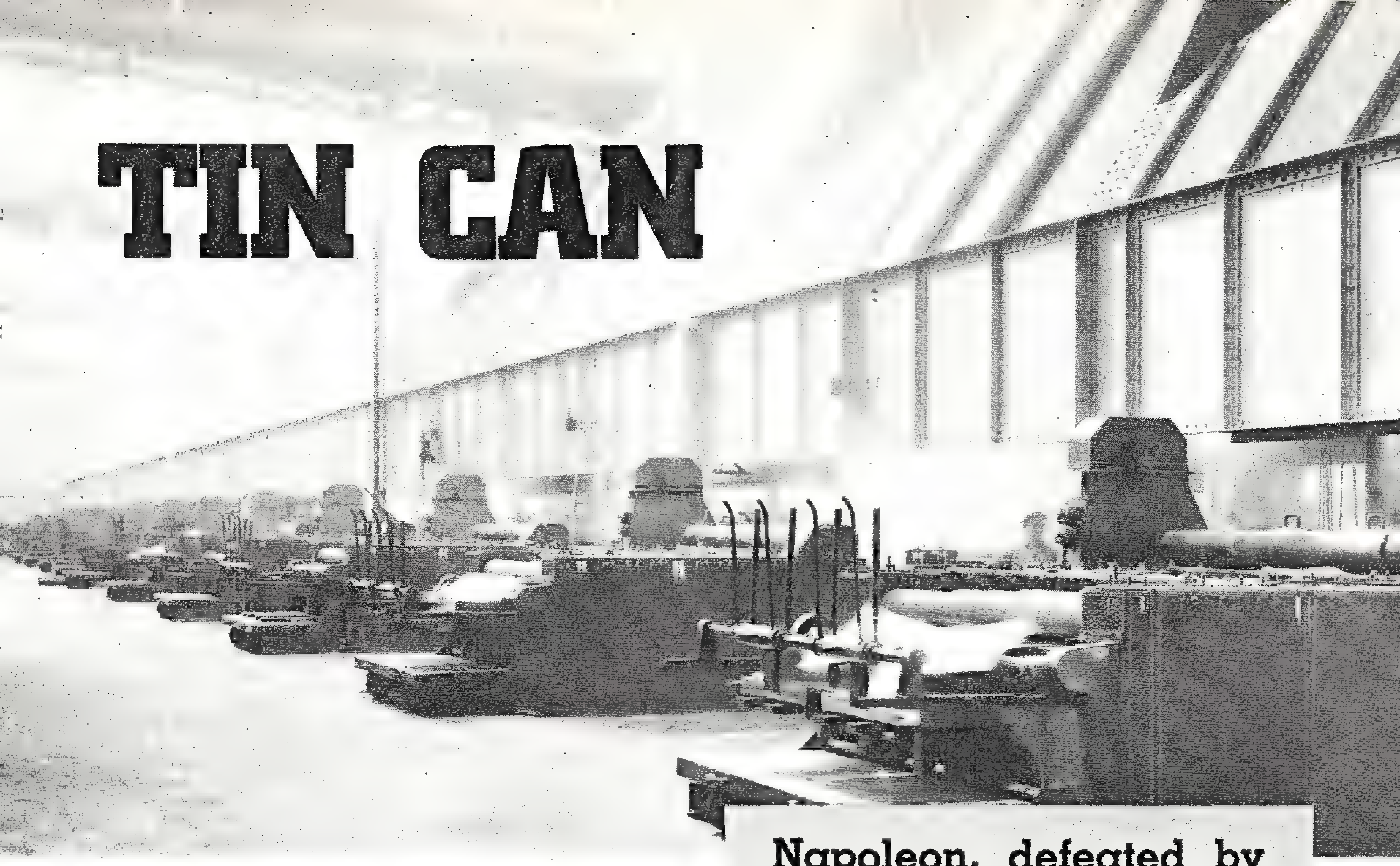
A can of beer these days is a far cry from that long dead era when "rushing the growler" was something pretty vulgar. This is a summer scene on New York's swank Fifth Ave.

Yet, what we call a tin can is not a tin can at all. The lowly tin can—nemesis of the alley cat, object of fun and ridicule—is made of a thin strip of steel, with a film of tin on its outer surface. The tin can is slightly more than 98% steel; slightly less than 2% tin.

In America we refer to the "can" or the "tin can" and to "canned goods" or "canned foods"; in England the term is the "tin" or "tinned foods." But "tin can" is decidedly a misnomer. We might as reasonably call our bathtubs "enamels."

This is how it came about. Back in the early eighteen hundreds metal food containers were being developed—the ancestors of today's tin can. They were known as tin

TIN CAN



What makes the "tin can" tin—tinning machines plating sheets of steel to supply the big canning industries.

by Nelson H. Budd

Napoleon, defeated by Nature—his armies starved on retreat from Moscow, first dreamed of victories by preserving food to feed his men. Had canned rations been available he might have conquered world.

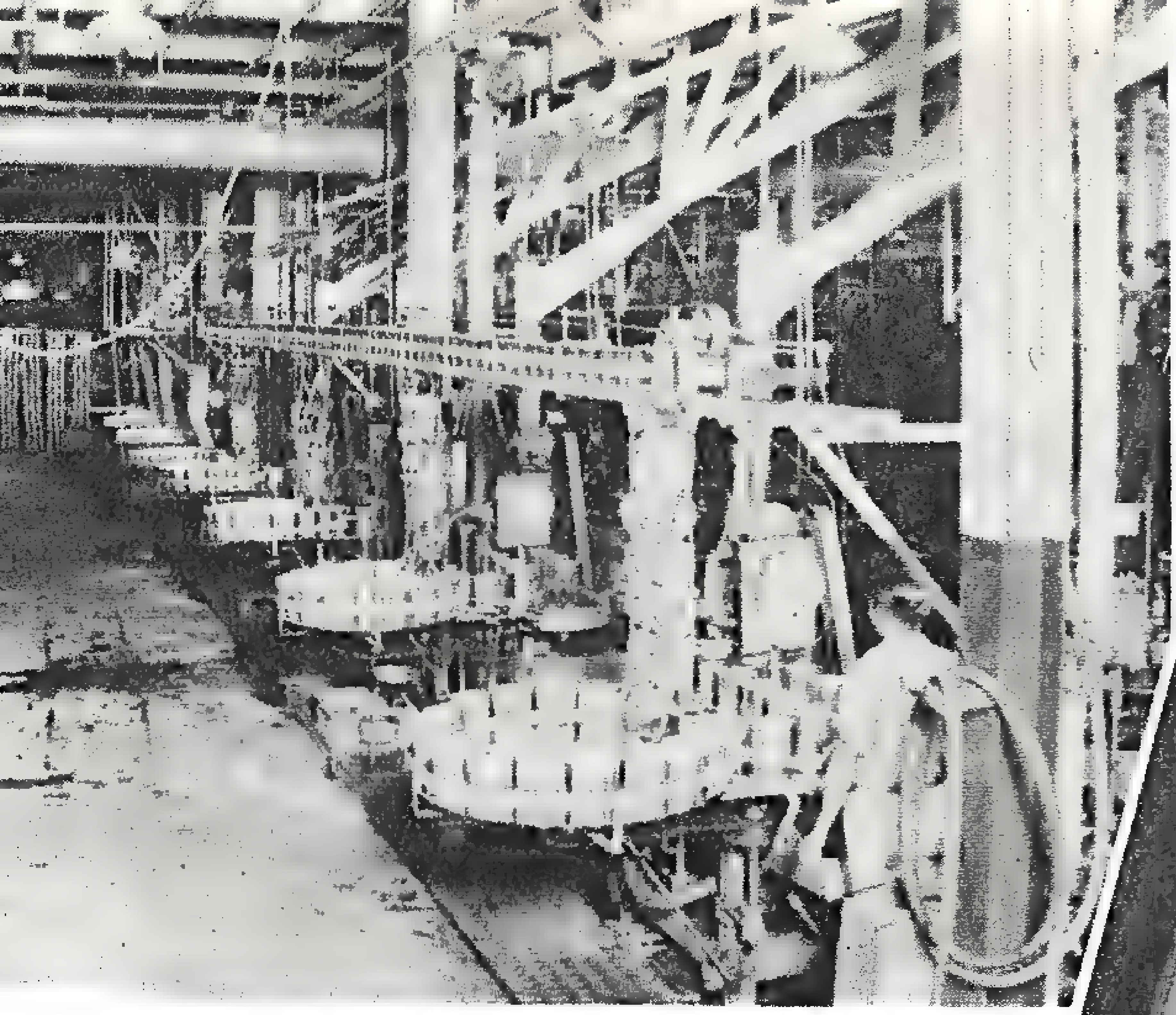
An antique can of corn, the granddaddy of today's streamlined can (right). This relic of the present industry was handmade in a Maine cannery.

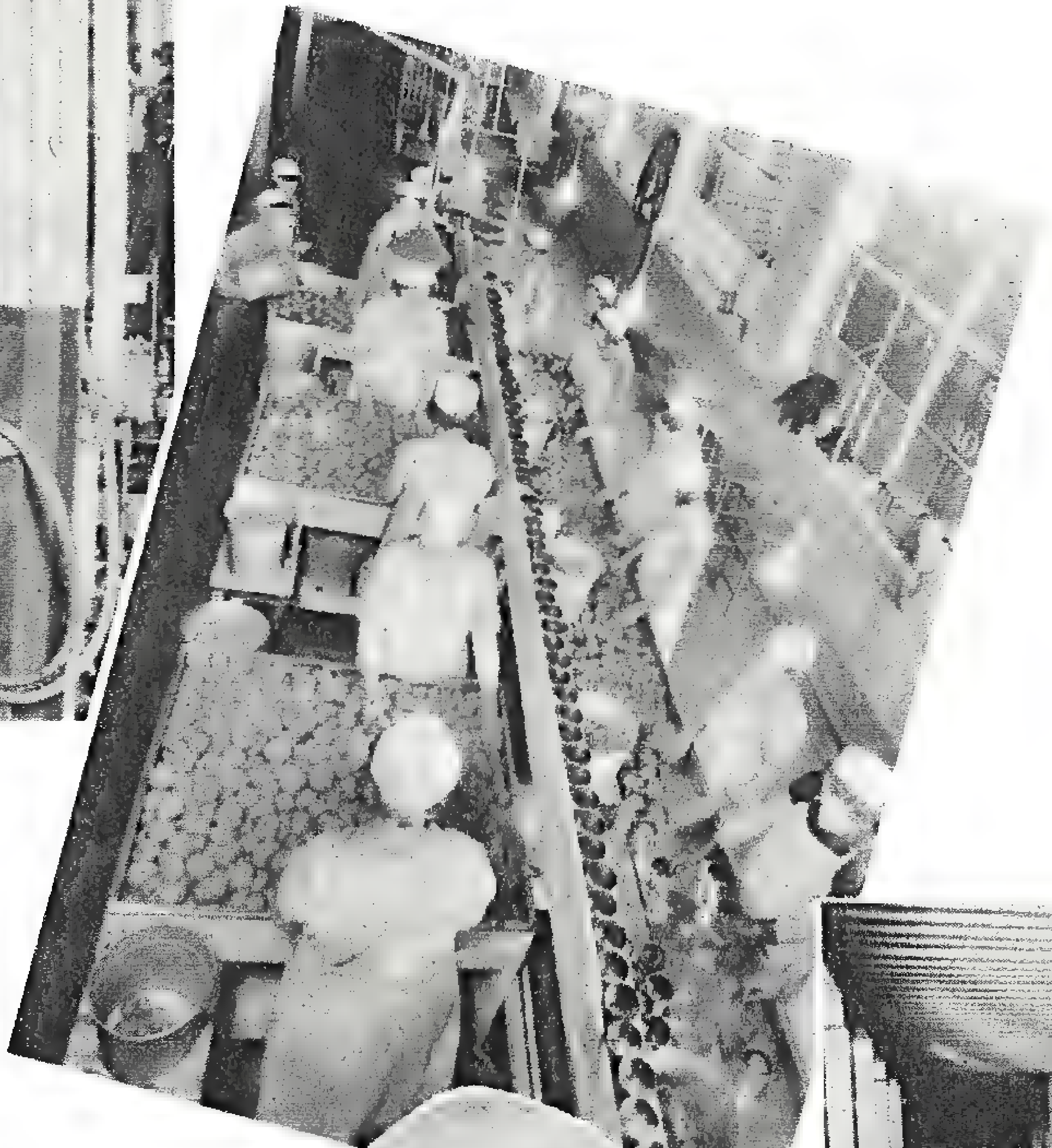
canisters. Copies of the yellowed order books of the salesmen show that they almost always abbreviated their notes, as "tin cans." or "cans." And thus the word got into the vernacular to stay.

Every now and then a new canned product seizes public acceptance and shoots the manufacture of cans up into the millions. Within the past two years beer in cans has swept the country. Since this has occurred, the consumption of packaged beer, which formerly stood at 25% of the total output, has risen to 35%.

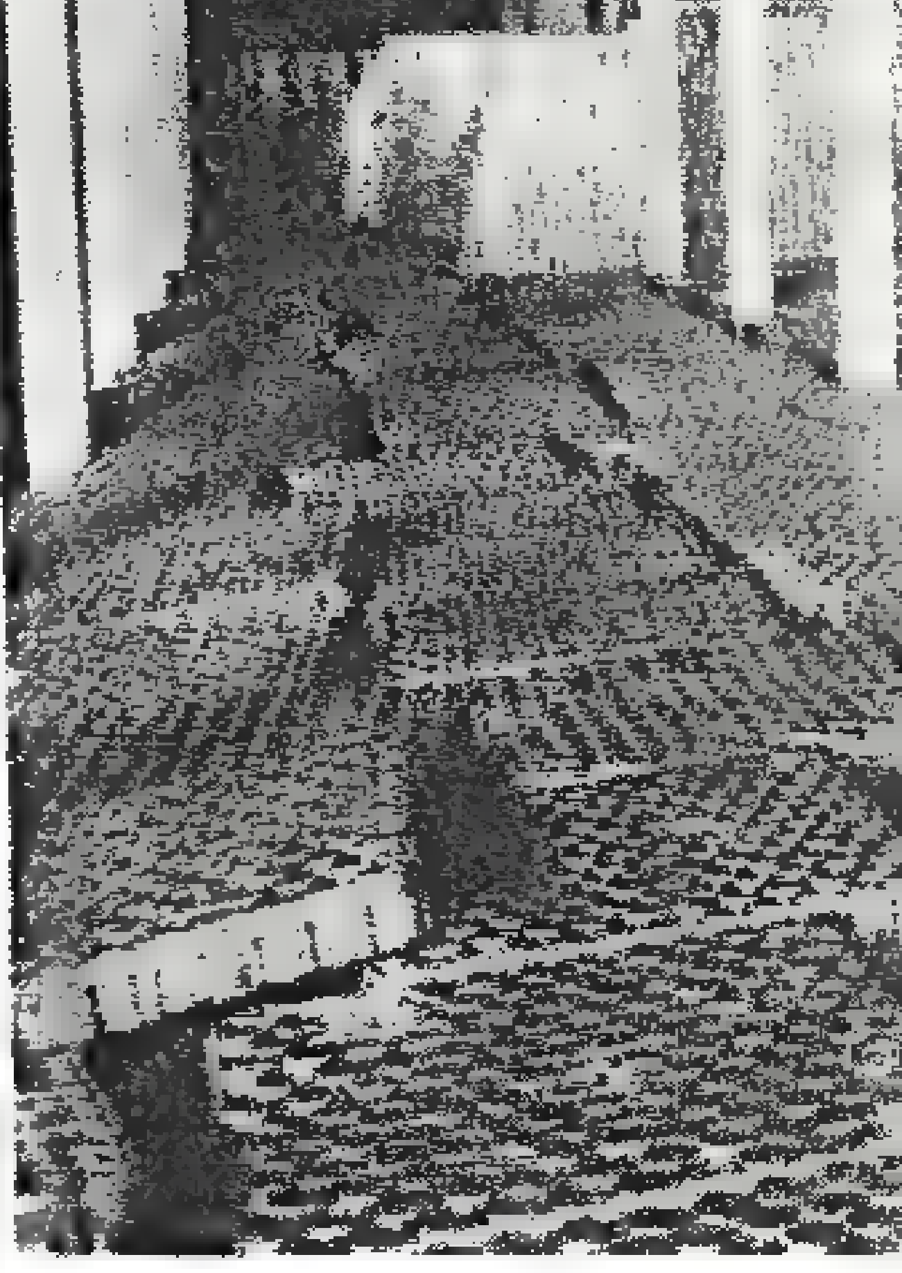
The phenomenal success of beer in cans has led vineyardists to the conclusion that wine also can become a profitable and popular tinned product.

Nine wineries, alarmed at the present exorbitant prices of their product in highly-





Conveyer belt carrying empty cans to the production line in Hawaiian Pineapple Company, Ltd., cannery. At right, tomato inspection line in Kemp Brothers' Packing Company in Maryland.

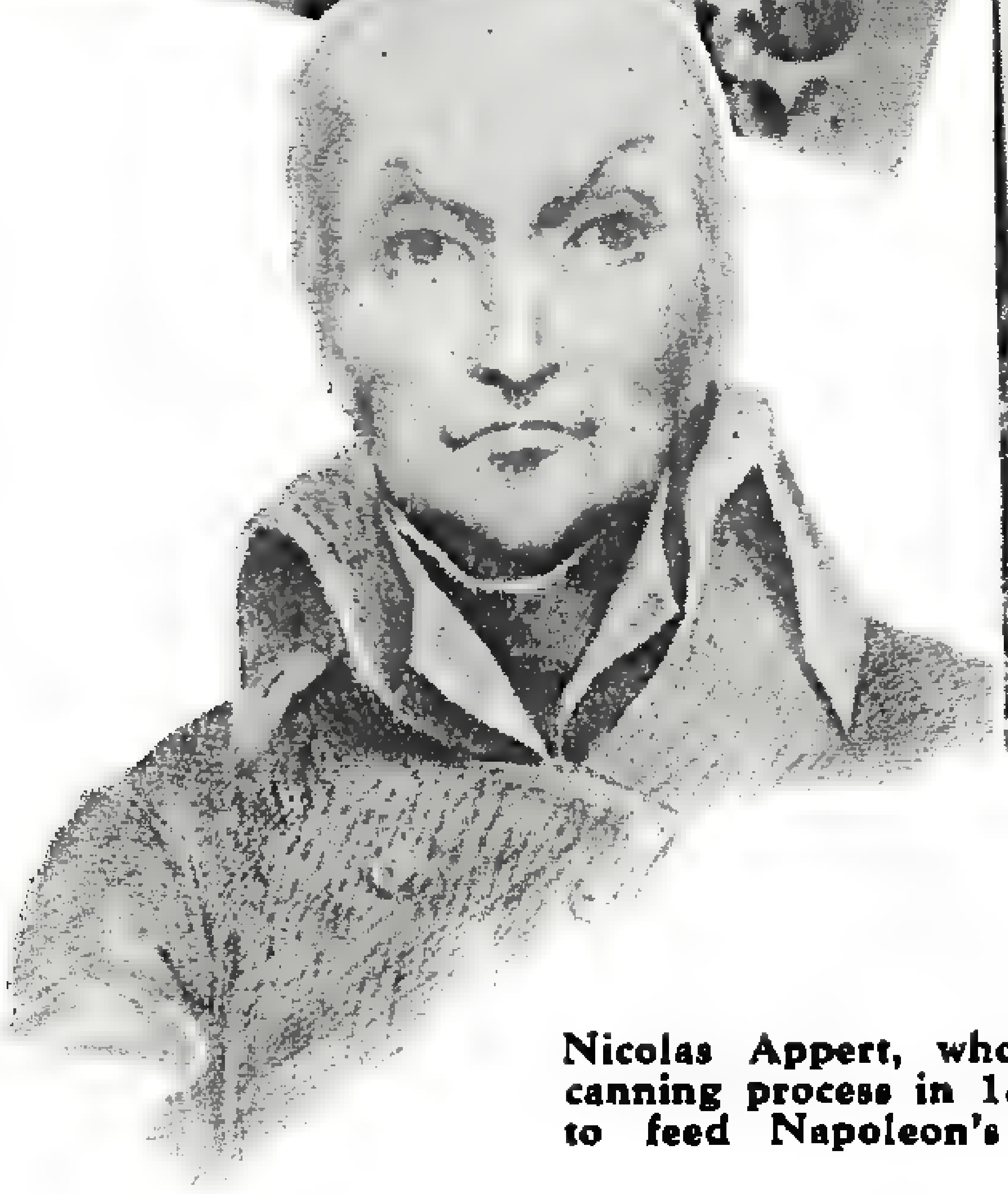


taxed liquor stores, which have tended to swing purchases in favor or beer and hard liquor, plan to encourage consumption of domestic wine by offering it inexpensively in cans in grocery stores as an adjunct to the home menus.

The entire history of the tin can is dotted with revolutionary occurrences of this nature. In fact, the chronology of can making is completely tied up with the history of canning. The two are inter-dependent, like the chicken and the egg. Which came first, manufacture of canned foods or manufacture of containers to hold them? As a matter of fact, the two have grown to man's estate, in perfect pace. Each has contributed to the other's growth. An improved canning process might bring a new food into the market, thus creating demand for millions more cans. Or an improvement in actual can manufacture would in turn make possible new production volume in canned foods. The phenomenal growth of the manufacture of tin cans has been caused by the increase in canned foods consumption, and it works both ways. No history of the tin can is possible without bringing in alongside it, the history of the art of canning.

The tin can is chiefly important because it makes possible what the inventor of the method of food preserving set out to accomplish 140 years ago—a way to cook food and to contain it, so that it would be edible for long periods of time.

The method of preserving food originated in France; the method of manufacturing the tin can, in England; but the development, both of food preservation and can construction to today's remarkable status, is American.



Nicolas Appert, who invented the canning process in 1809, in a hope to feed Napoleon's huge armies.

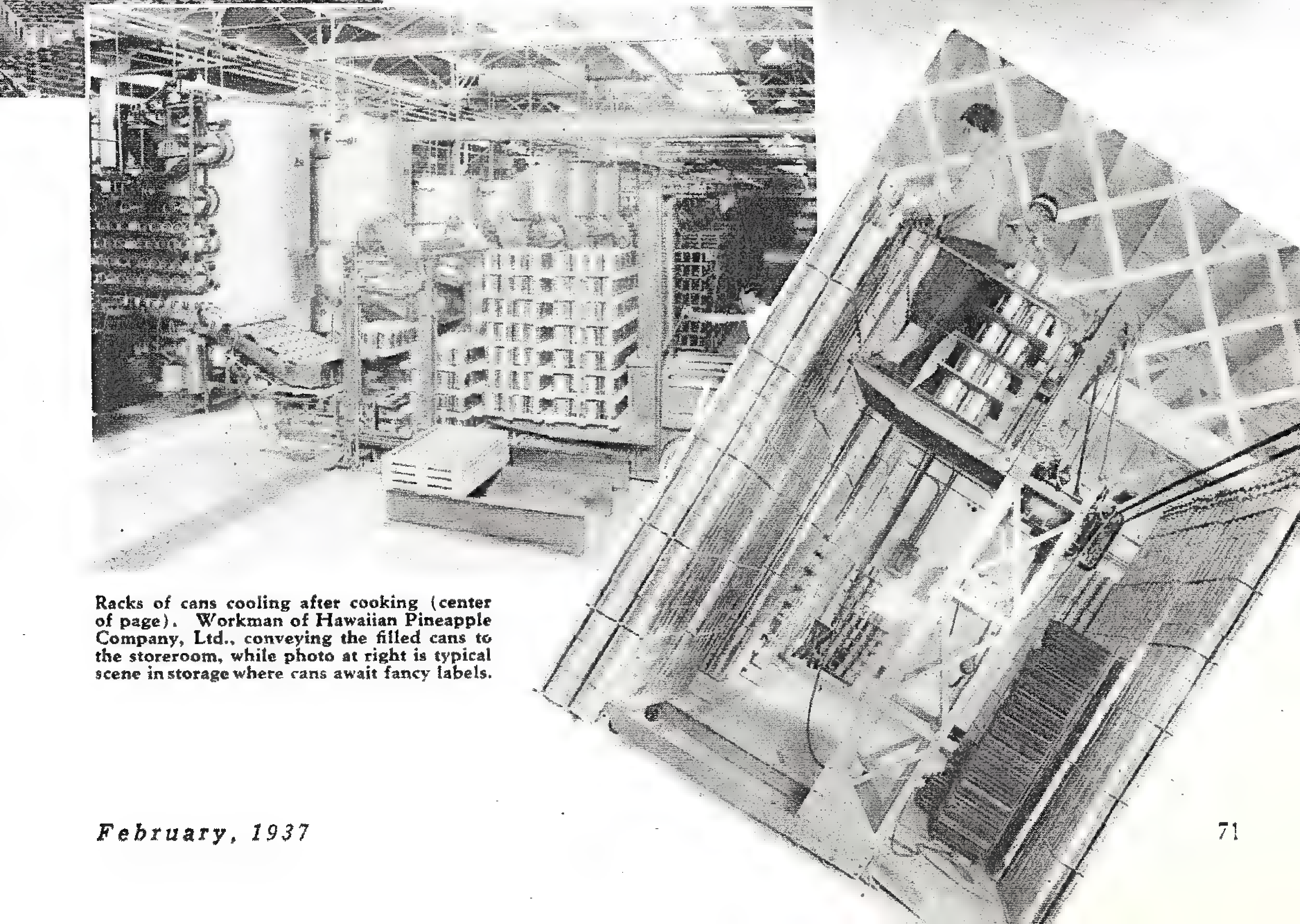
Back in 1795 nearly every nation in Europe was fighting France and she had revolution at home. The Government needed some method of feeding its armies abroad and its sailors at sea. Scurvy ravaged the sailors; foraging was not always feasible in the Napoleonic campaigns. A prize was offered to the Frenchman who would solve the problem. It was won by Nicolas Appert in 1809, though he'd been working on it long before the prize was offered.

He was the Father of Canning and therefore, the Father of the Tin Can, although his first experiments were performed with glass jars and bottles, closed with corks. Appert's theory, worked out long before Pasteur, is the theory still followed by commercial canners today. He sterilized the food by heat and he sealed the container hermetically. Though his apparatus was crude and awkward, he was painstaking and thorough, and he perfected a theory, and put it to the test that has proved one of the greatest benefactions to mankind's comfort and health.

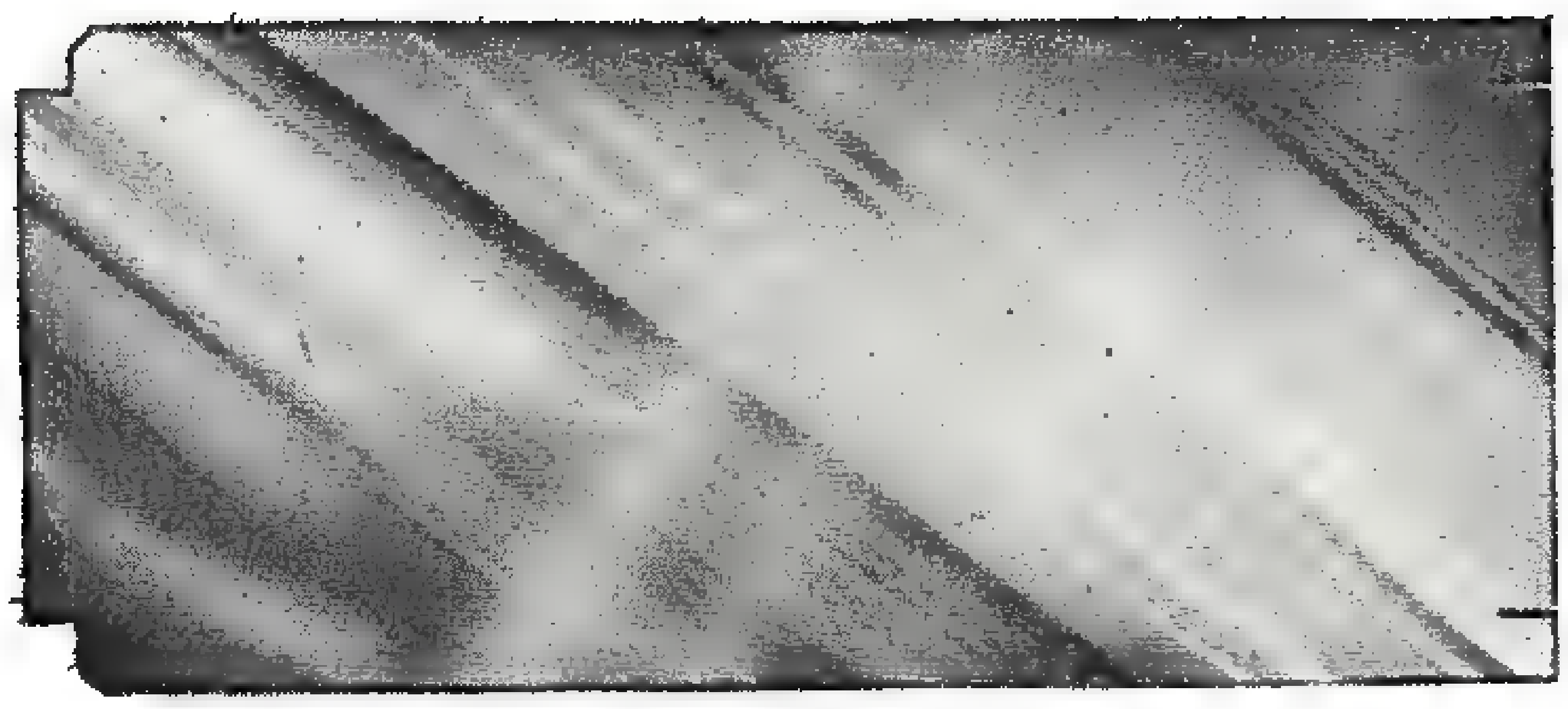
In the fourth edition of Appert's treatise on his new method of preserving foods he mentions the use of canisters. But the French were poor artisans in tin and Appert had to make them in his own factory. He had tin plate of poor quality and numerous other difficulties, and though he applied his best resources to the problem, Appert's real contribution was the all important method of processing foods, rather than the invention or development of the container.

While Appert was thus engaged, an Englishman named Peter Durand obtained a patent in 1810 for a tin plate canister. Now we see the first tin can emerging out of history. It was cylindrical, like the one we see coloring our grocery and pantry shelves today, but was made entirely by hand. The

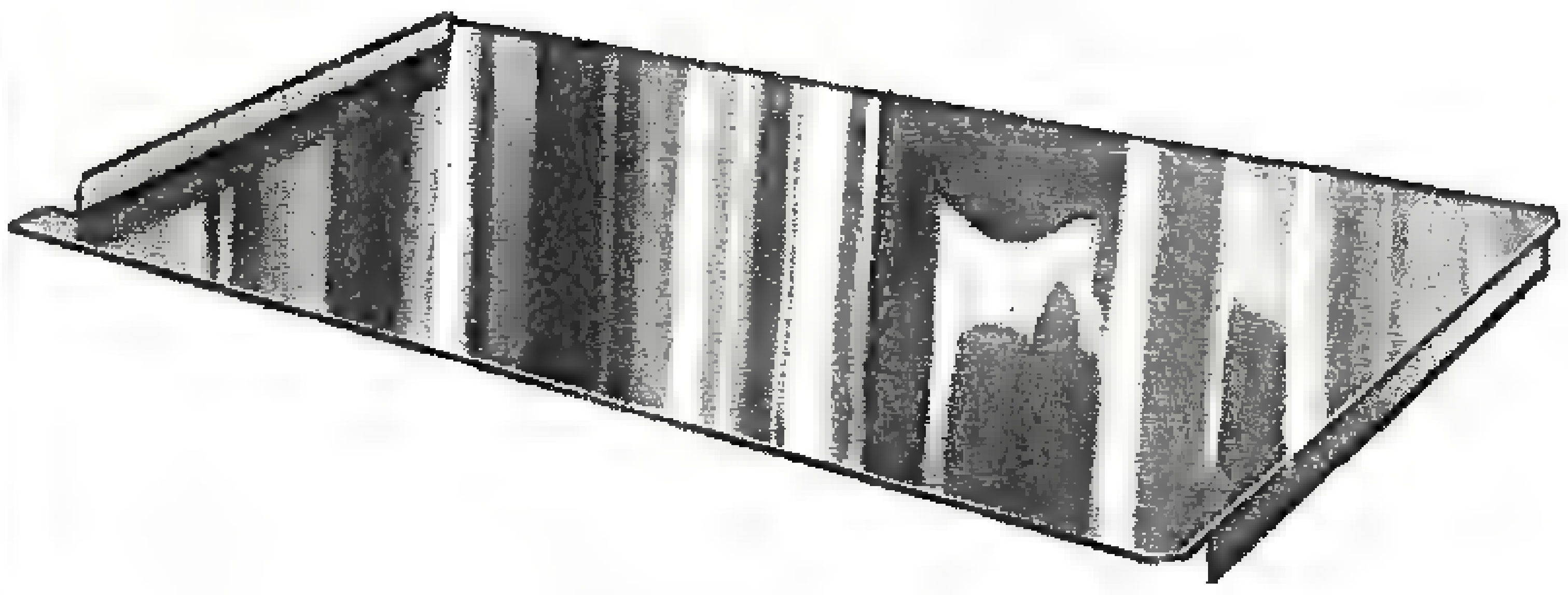
These three, snapped as they strolled the board walk in Atlantic City in 1923, are the men who put over the modern can. Left to right, George Cobb, Sr., the late Charles Ams and the late William Y. Bogle.



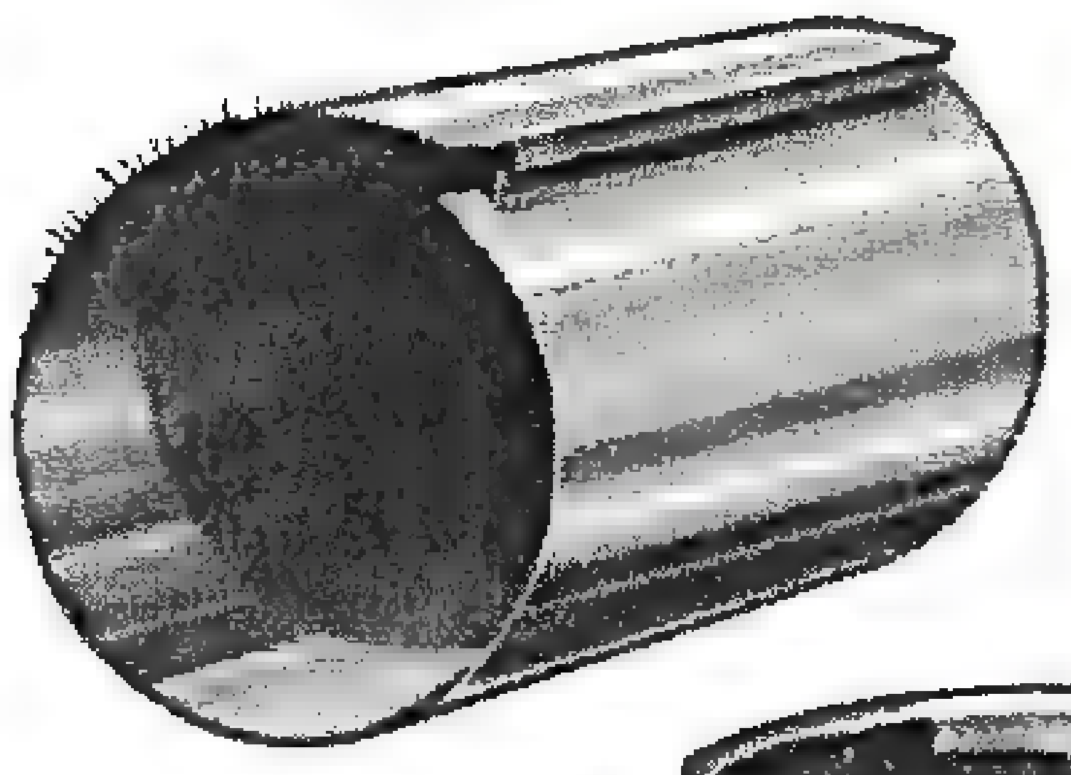
Racks of cans cooling after cooking (center of page). Workman of Hawaiian Pineapple Company, Ltd., conveying the filled cans to the storeroom, while photo at right is typical scene in storage where cans await fancy labels.

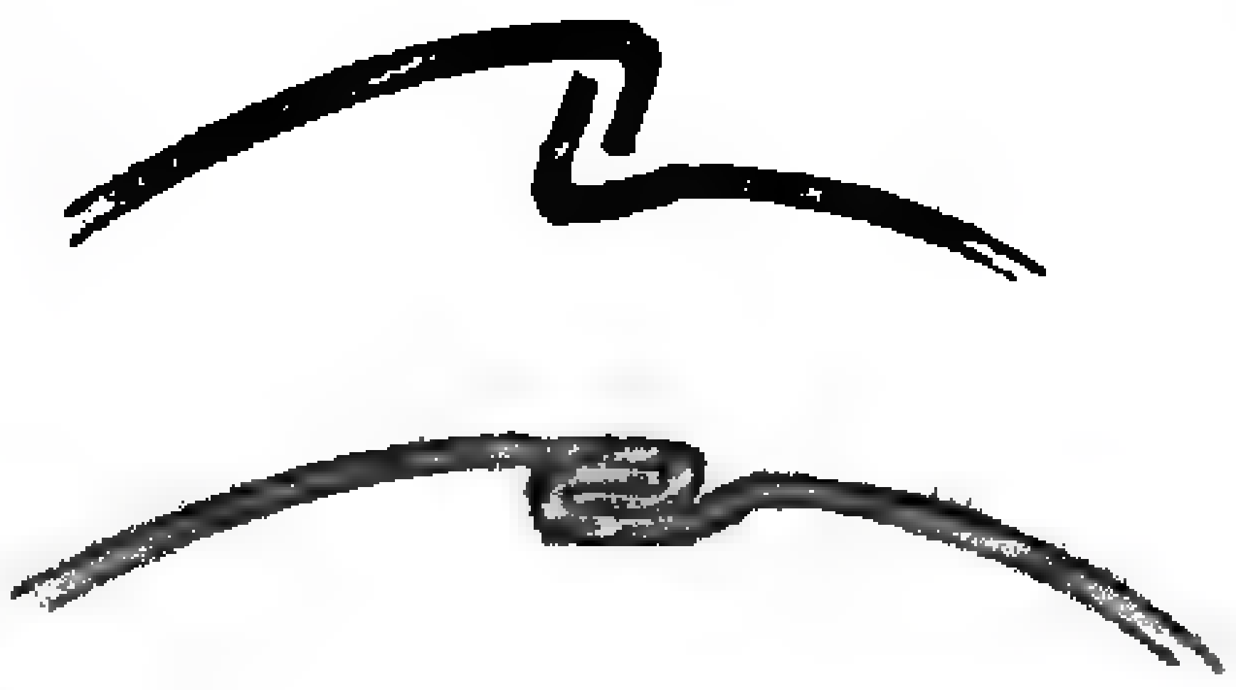


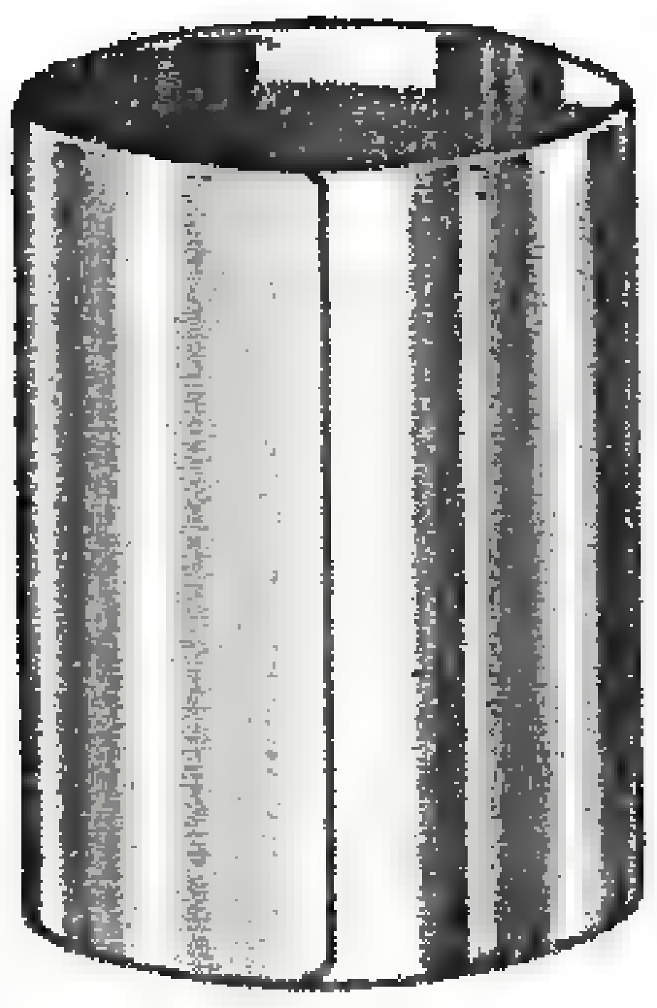
Flat sheet of tin plate cut into size for body of the can. Notches help to make the sealing process perfect.



The ends of the body are next turned back in opposite directions. Ends lock when blank is curved.



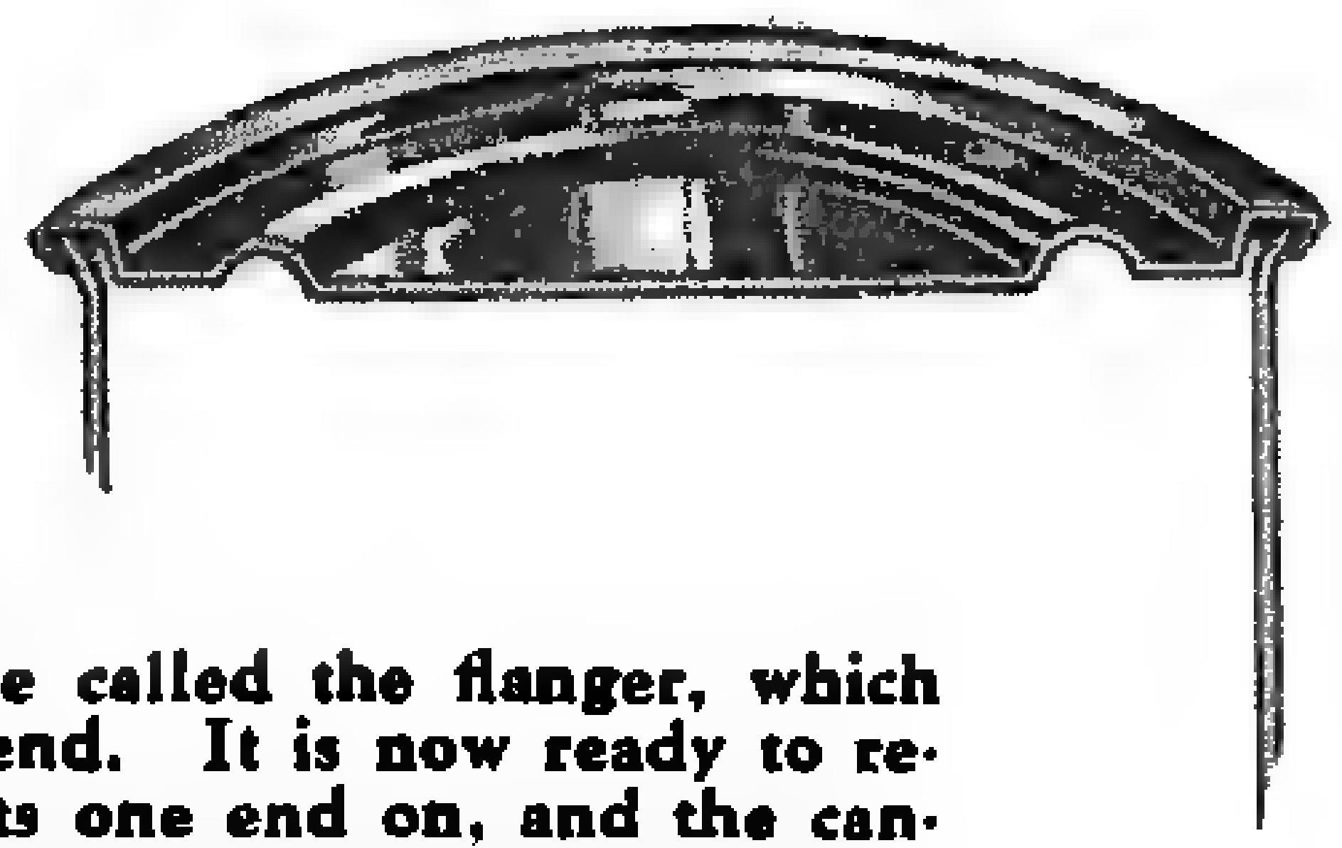


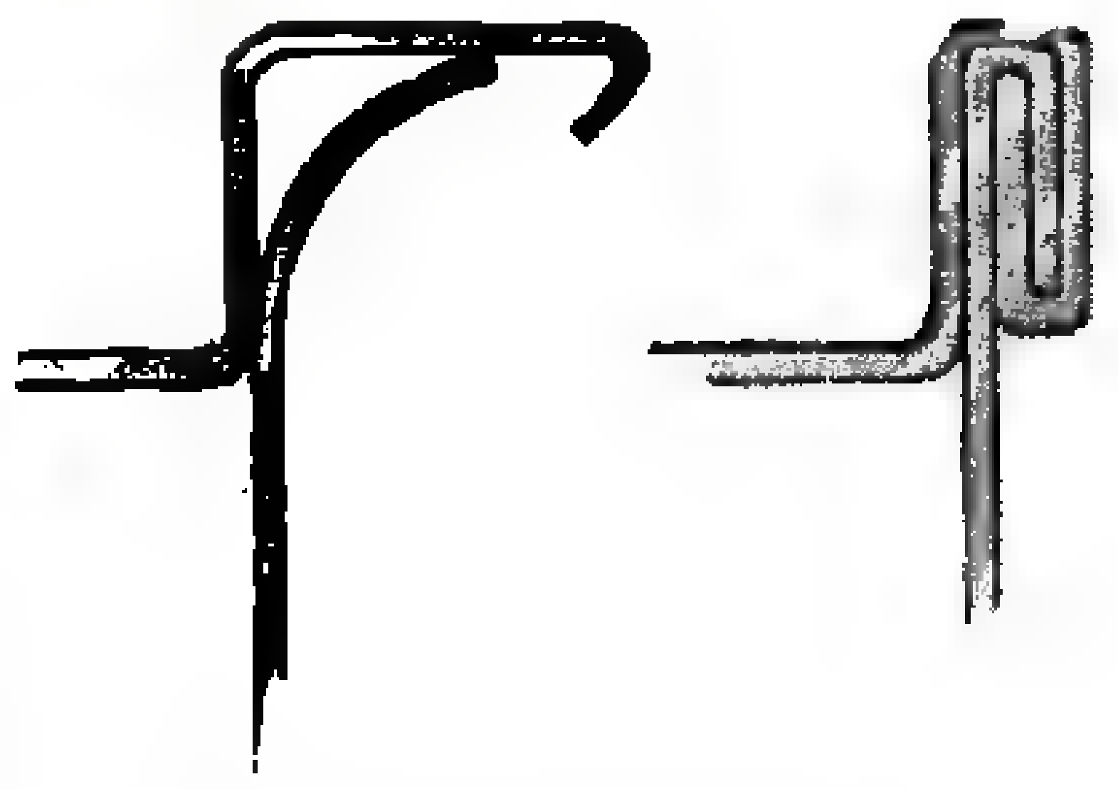


The body of the can now receives a second flux bath and then solder, which is always on the outside of the seam only.

The reason for the notches at corners. Without notches there would be four layers of tinplate at the seam, which would make sealing difficult indeed.

The hooks are brought together and pressed to form the seam. The extra thickness is inside the container.





The final operation is done by a machine called the flanger, which curls the rim in an outward flare at each end. It is now ready to receive its ends. The can manufacturer puts one end on, and the canner puts top on. Can manufacture and canning are different industries.

A double seamer machine folds the ends and the body tightly together, making solder unnecessary.

raw material was lavishly tinned iron sheet Using shears and a soldering iron, a tinsmith cut an oblong piece of tin, curved it and soldered its ends together to form the body. Then he cut a round piece for the bottom of the can, bending its edges over a circular mandrel, and soldered this on one end. After this was filled with fruit, fish, vegetable or meat, a similar round piece was soldered on the top. A small hole was left in the top so that air could escape as the food in the can expanded while the can boiled. With the can still hot, a drop of solder closed the hole. Sometimes a little globule of this solder dropped down inside the food, but in those days people didn't mind so much.

With Appert's method and Durand's canister, meat was successfully put up for sea voyages. The canning industry had been launched and the can making industry was on its way. Appert, who received a prize of 12,000 francs from Napoleon, had really started four great industries—canning, can manufacture, canning machinery manufac-

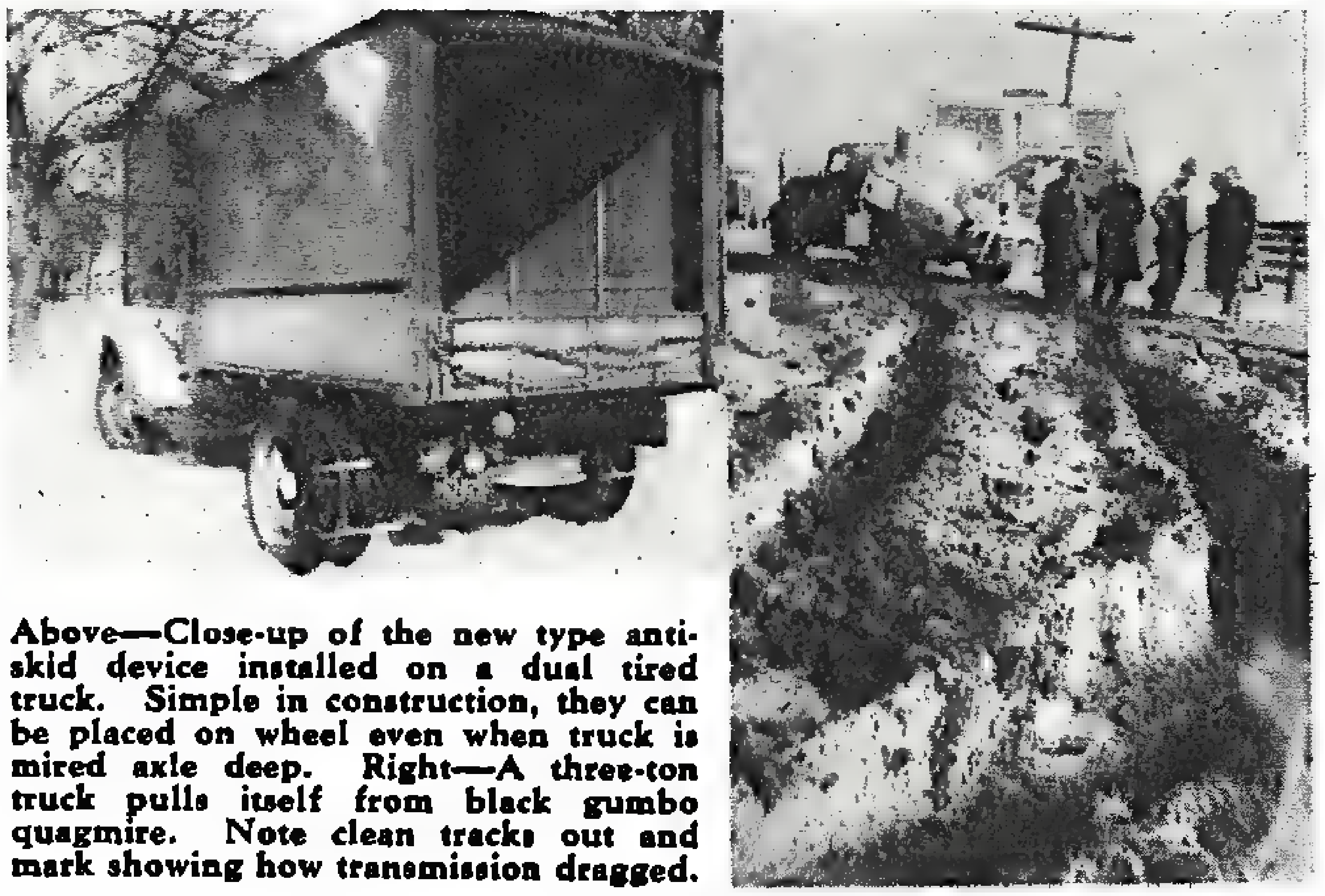
[*Continued on page* 132]

Round cans are not suited to everything. So asparagus gets a tailor-made square container. Sardines are another food that must be pampered.

Lug Type Anti-Skid Device Aids Heavy Trucks

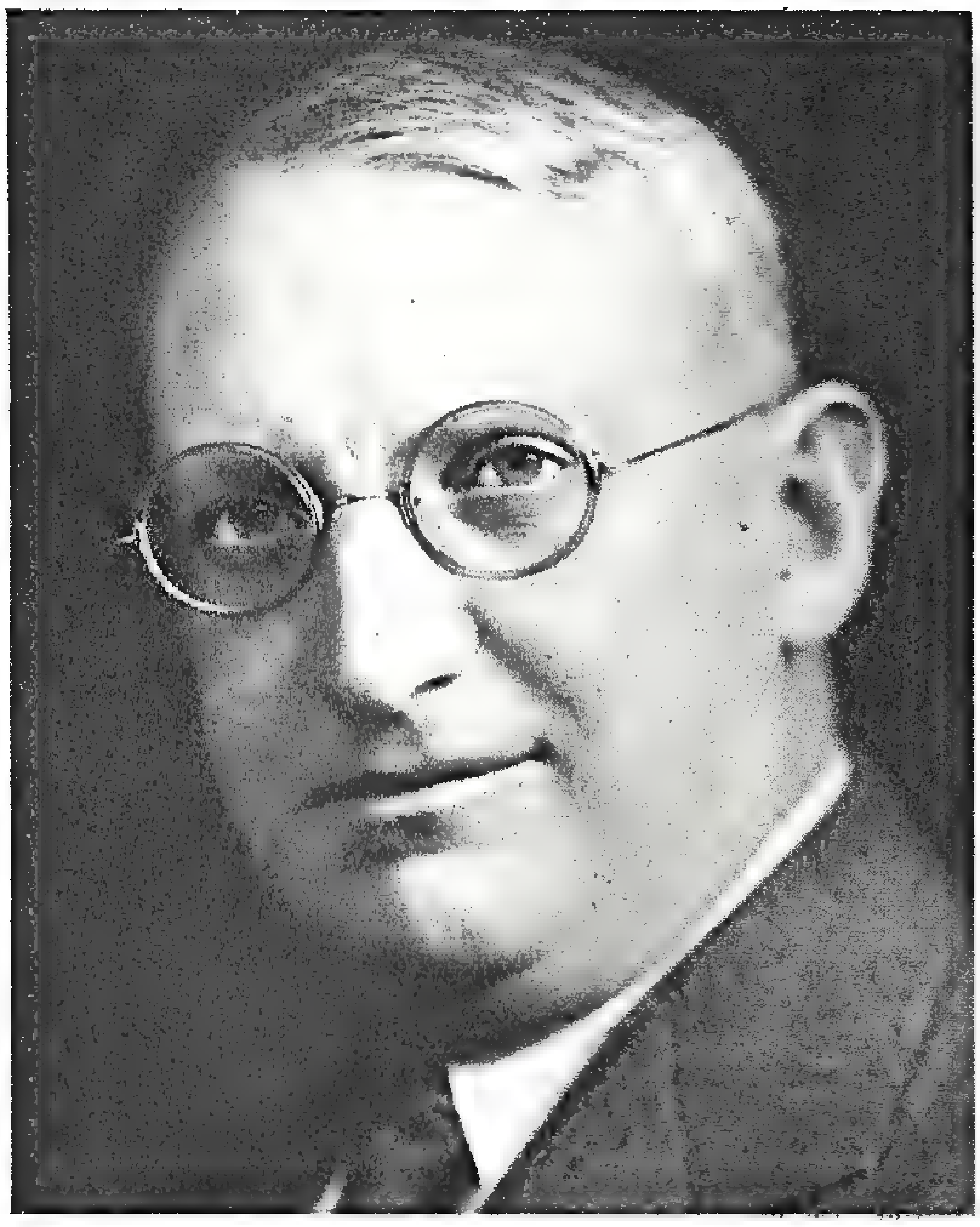
A NEW type of anti-skid equipment for dual tired vehicles is said to require 50% less motive power for pulling through adverse road conditions than is required by conventional skid chains. The new equipment can be installed without the aid of jacks and can be put in place even though the vehicle is mired to the axle in mud, snow, sand, etc.

The anti-skid device, invented by W. P. Wannemacher, a Bloomington, Ill., garage operator, consists of several drop forge lugs, heat treated and case hardened, attached independently to a center fastening chain. In tests, the lugs withstood hundreds of miles of driving over bare pavements. Device fits all standard wheels.



Above—Close-up of the new type anti-skid device installed on a dual tired truck. Simple in construction, they can be placed on wheel even when truck is mired axle deep. Right—A three-ton truck pulls itself from black gumbo quagmire. Note clean tracks out and mark showing how transmission dragged.

Kodak Official Gets Medal



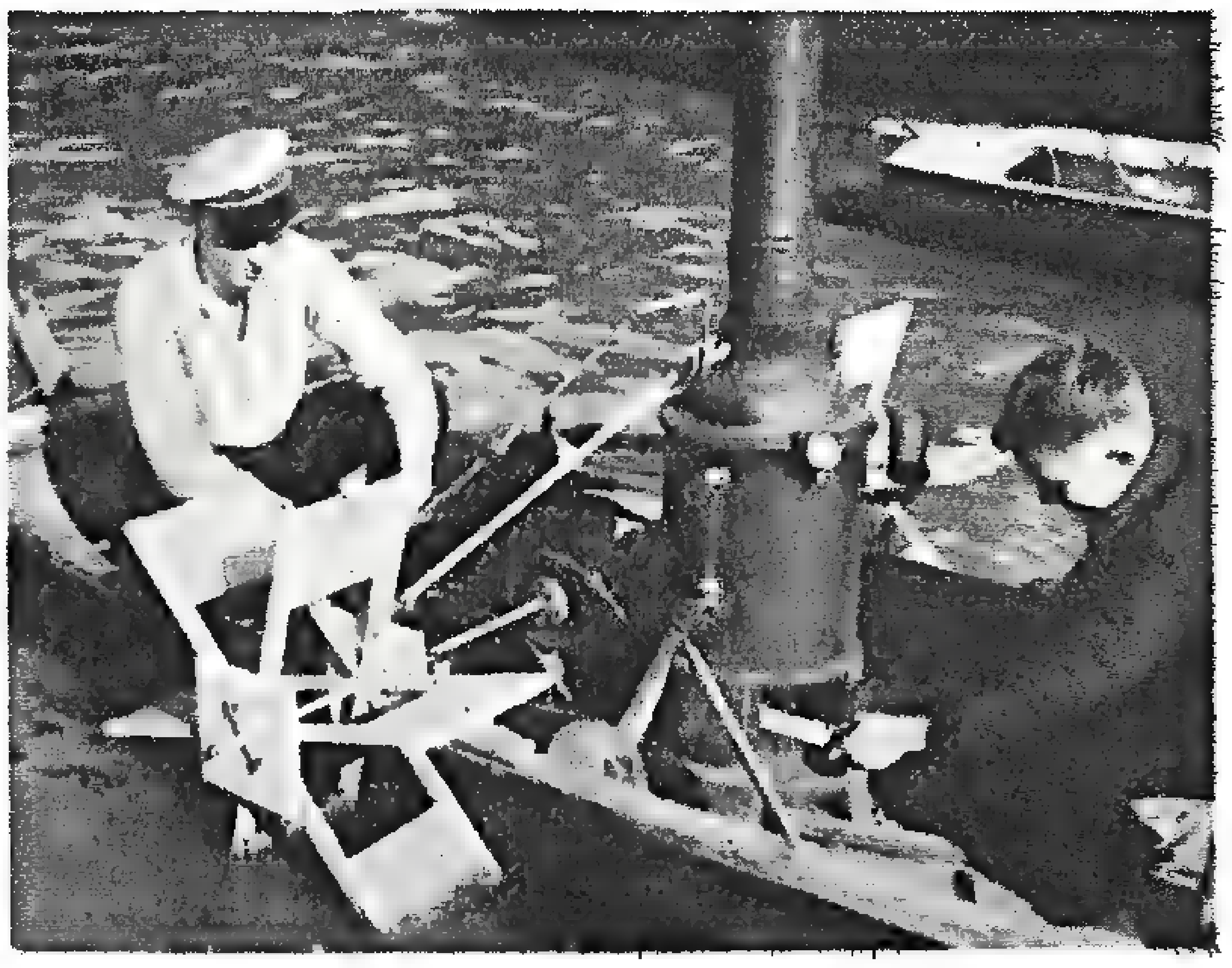
Dr. C. E. Kenneth Mees, Eastman Kodak Company research official, was awarded the annual Progress Medal of the Society of Motion Picture Engineers for his outstanding work in photography, particularly in advancing field of amateur movies.

THE Society of Motion Picture Engineers has awarded its annual Progress Medal to Dr. C. E. Kenneth Mees, vice-president in charge of research for the Eastman Kodak Company of Rochester, N. Y. In 1935, Dr. Mees perfected a three-color movie process.

Scout Devises Steamboat

USING a flat bottomed metal rowboat and materials gathered from scrap piles and junk heaps, a Sea Scout at Creve Couer Lake in St. Louis County, Mo., constructed a paddle wheel steamboat. The craft travels at a speed of five miles per hour.

In building his boat, Homer Wieser, youthful inventor, salvaged an old boiler from a local scrap pile. He tested the boiler for 125 pounds hydrostatic pressure and then set the safety valve for 65 pounds. From another junk pile he salvaged an engine. With hand made drive wheels grooved to take a V type motor belt, and with the help of an idler, he created a friction drive which transmits power to twin, six-bladed paddle wheels. A tin can serves as a whistle and the boiler is wood-fired by Wieser's brother.



This odd looking paddle wheel steamboat was built by Homer Wieser (left), a Sea Scout, and his brother from materials gathered from scrap piles. Boiler is wood-fired to provide power. A tin can serves as a whistle for the strange craft.

SERVICING 200 TRAINS

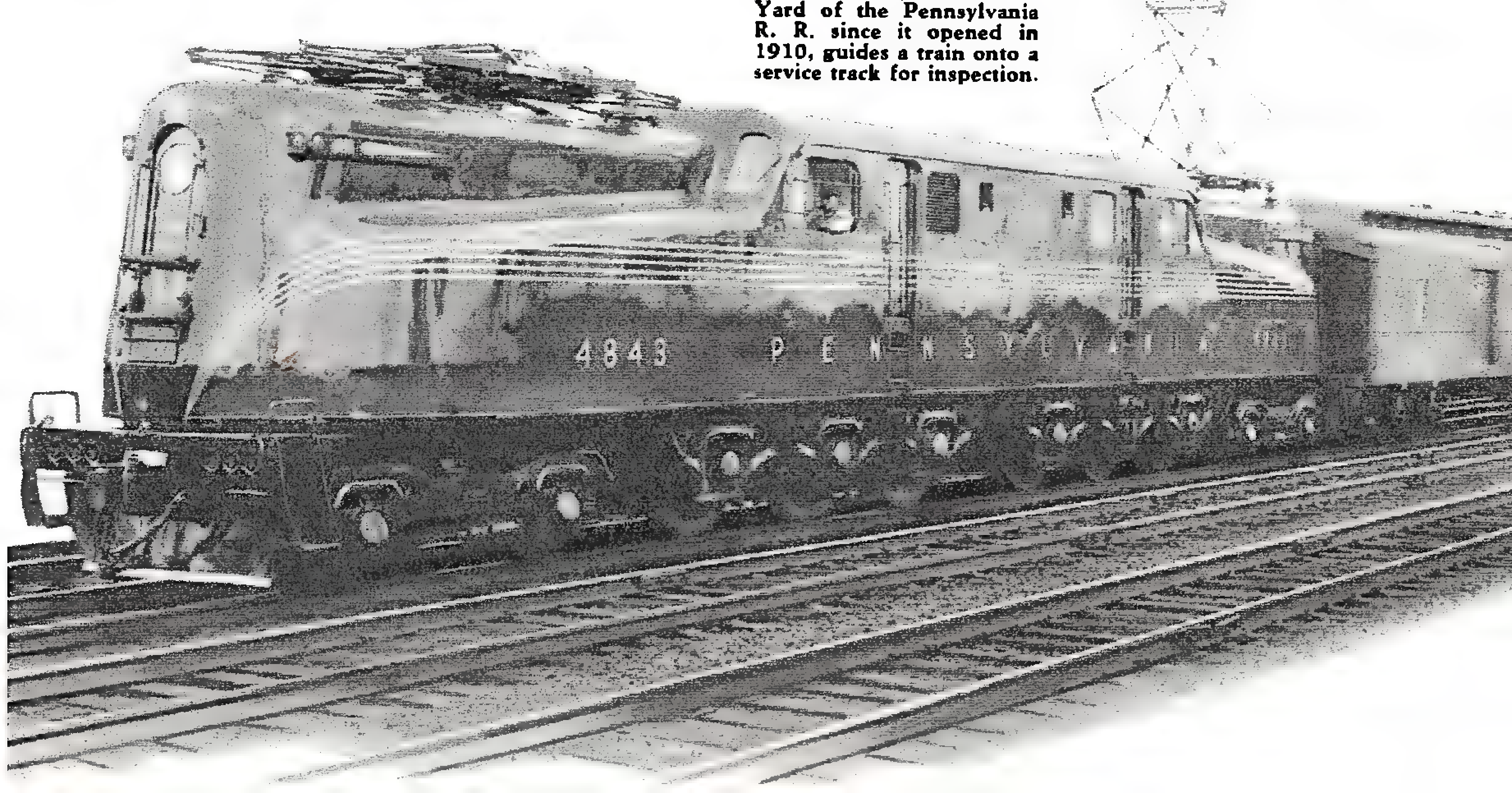
Long Island Plant of Pennsylvania, Greatest Passenger Yard in World, Achieves Hourly Miracles Oiling, Cleaning, Refrigerating, Repairing Its Array of Streamlined Marvels.

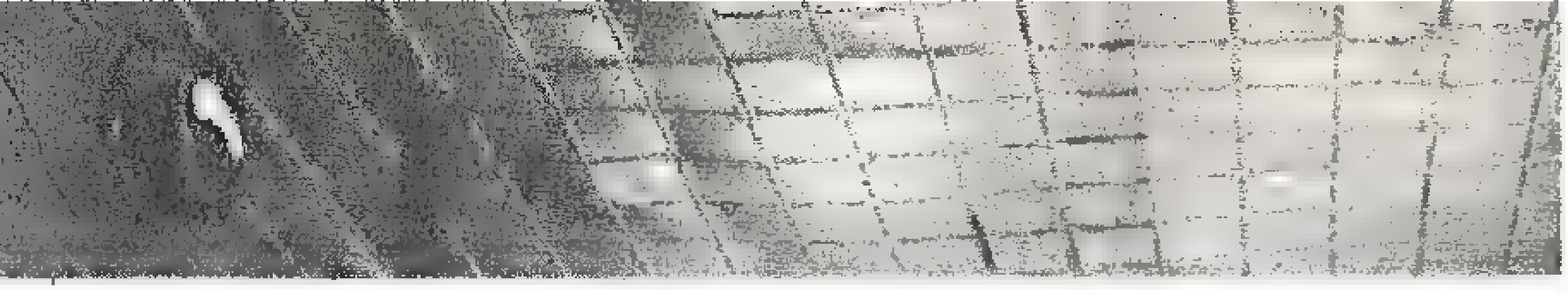
by Brian Hayward

Above—J. D. Maple, Yard Passenger Conductor at the Sunnyside, L. I. Yard of the Pennsylvania R. R. since it opened in 1910, guides a train onto a service track for inspection.

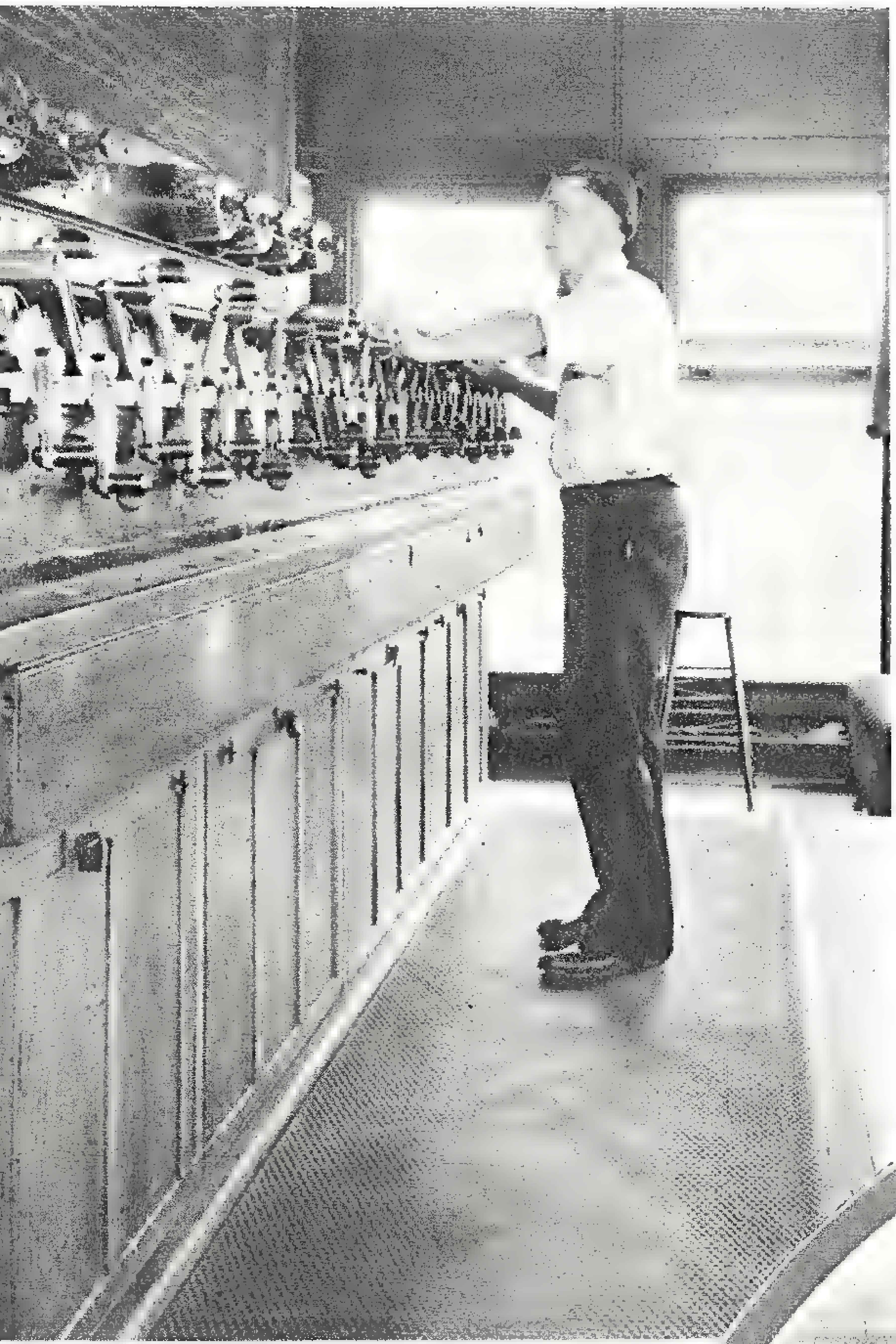
WHAT happens to the train when you leave it at the terminal? In earlier days it wasn't necessary to ask such a question. A clanking old switcher hooked on to the line of cars and yanked them out into the adjacent yard in full view, there to reach bake oven temperature in the summer sun or to become traveling refrigerators in winter. The terminal was then literally the end of the road and the engine of your train was right at rail's end when it stopped in the depot.

But modern railway terminals are in the center of big cities where land costs for the several hundred acres necessary for a present day railroad yard are prohibitive. Trains have to go elsewhere to the cleaners and the twenty to thirty other trades that service





DAILY AT SUNNYSIDE

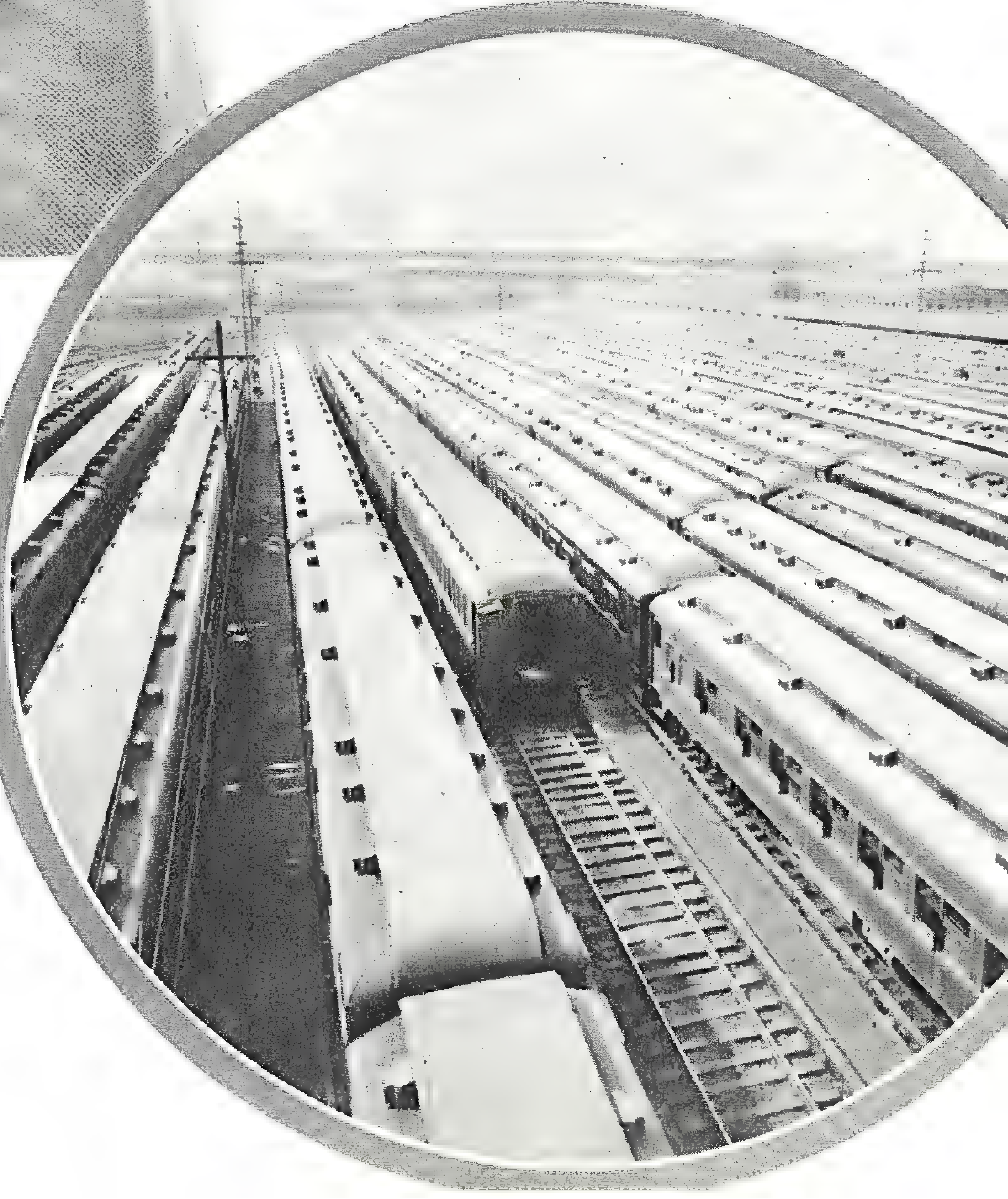


Above—"H" Tower, Sunnyside Yard. This is the interlocking tower that controls train movements from Long Island into the Pennsylvania Station in the heart of New York City. The trains are routed to tracks beneath East River. Underground route is 4½ miles long.

them before they again appear in the terminal headed in the other direction—west or south.

Suppose you have just come in on the Pennsylvania's crack No. 28, the sixteen-and-a-half hour Broadway Limited from Chicago. What becomes of it before it again appears in the Penn Station as No. 29 headed West? Odd numbers are west or southbound—even numbers east or northbound trains. When the engineer of a stalled train whistles his rear end brakeman back aboard, he blows five blasts if west or southbound, four if headed the other way.

In an old terminal the passengers walked the length of the platform, passed the big steamer with its compressor chugging as if the engine were actually panting. Instead of departing horizontally on the same level as the train, he now leaves by the nearest stairway and comes out into daylight two flights above. The 4,600 h.p. streamlined electric that picked up his flyer at Paoli is so far up ahead in the recesses of the great underground station that he never sees it. But as soon as he



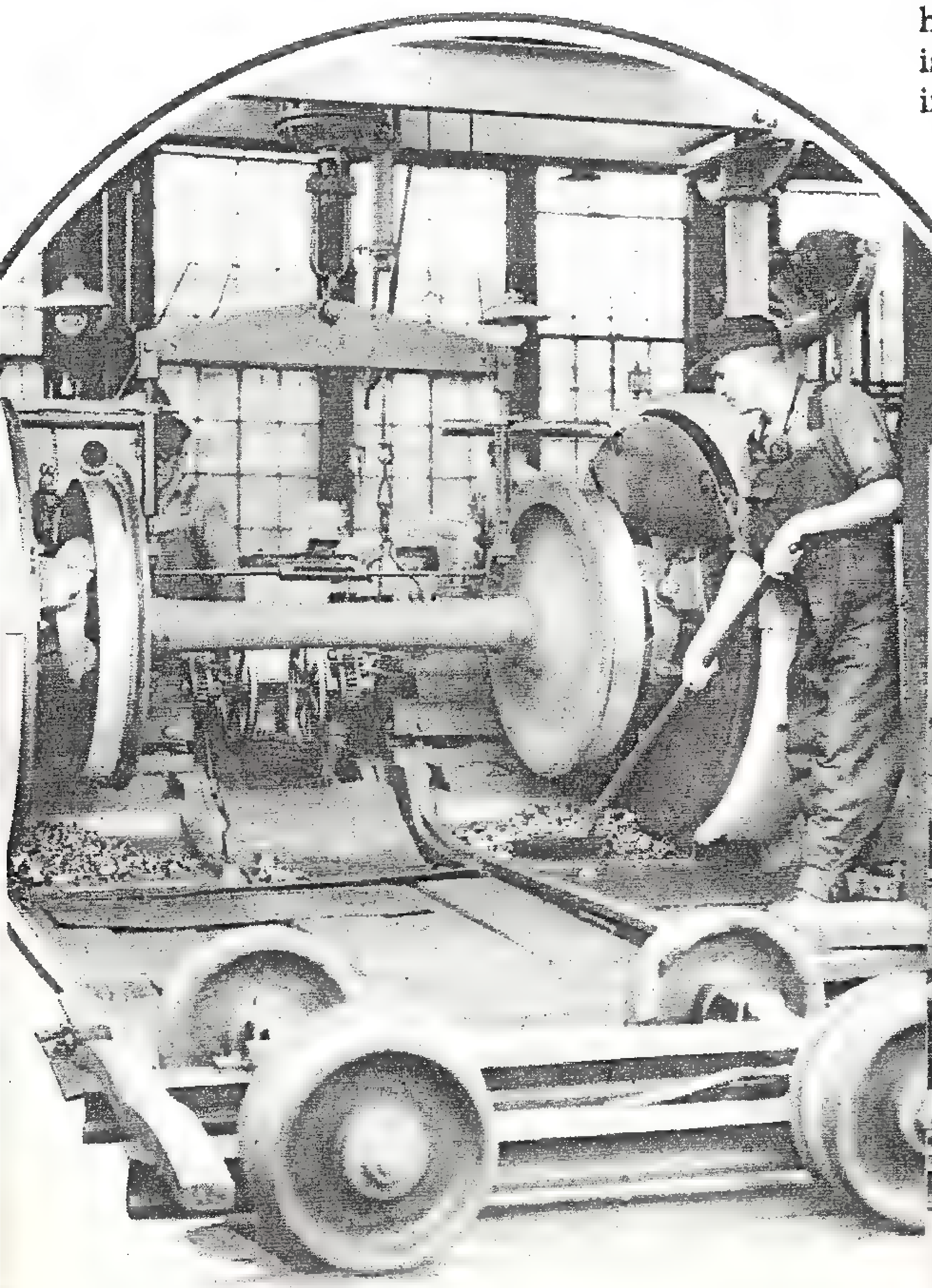
Left—Each day 200 trains are inspected, repaired, cleaned, and provisioned at Sunnyside. Right—A typical day's work.

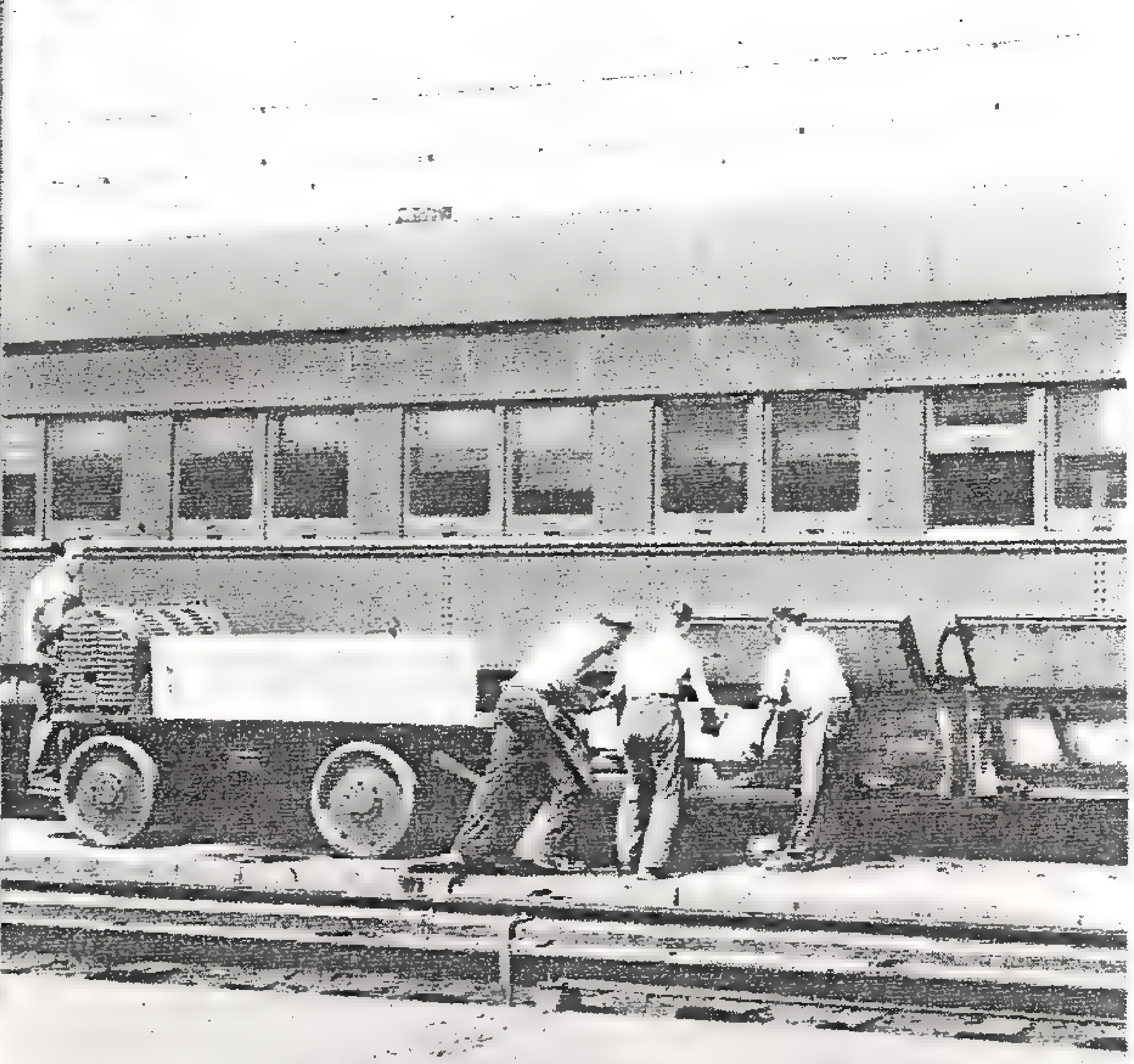
Supplies to provision hundreds of dining cars are kept in a commissary at Sunnyside. Trucks carry supplies to waiting trains. Pennsylvania R. R. diners feed 10,000 travelers daily.

and the rest of them have departed, it continues its eastbound trip through a 100 million dollar system of under river tunnels for another 4½ miles until it rounds the loop and stops on one of the 75 tracks of Sunnyside—the world's largest railroad passenger yard.

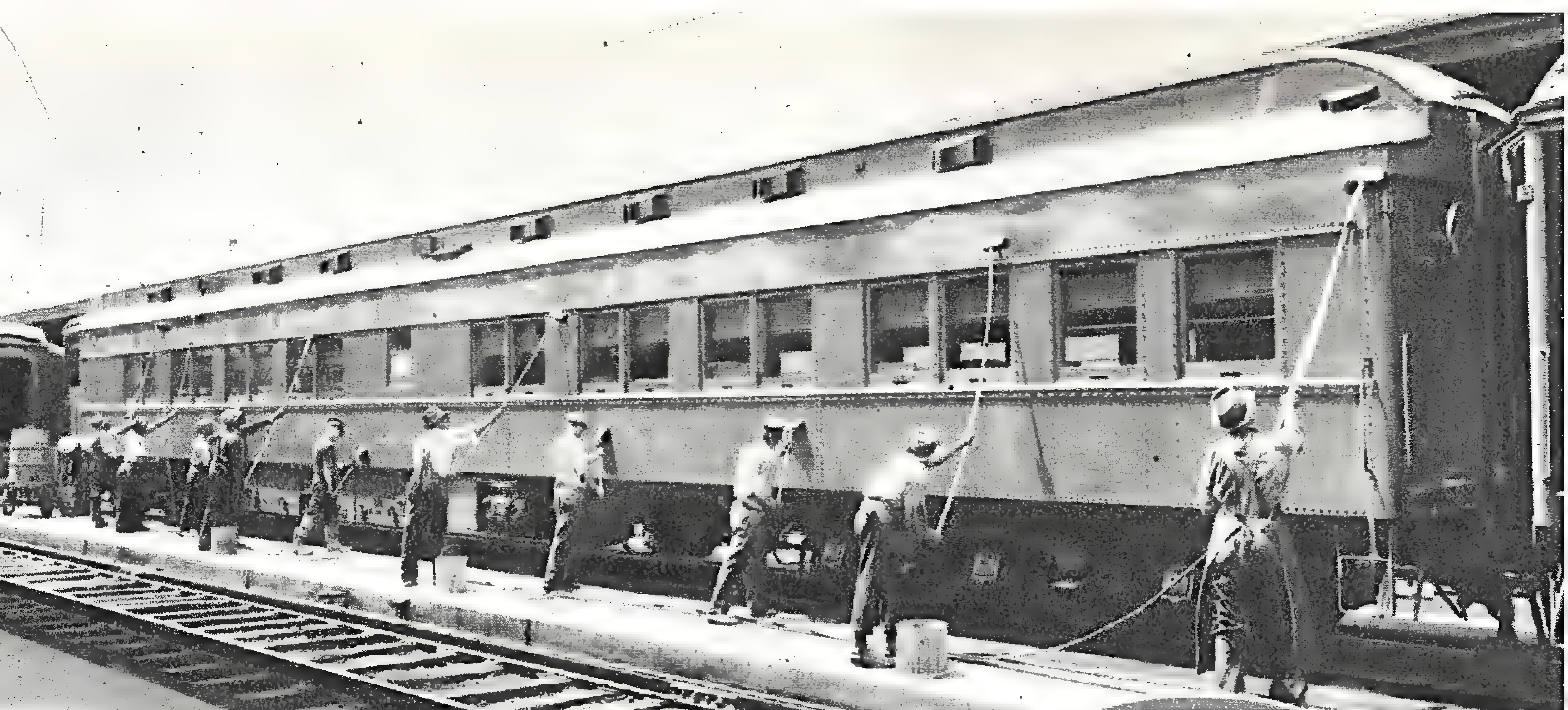
Sunnyside is a pretty sizable community in itself—one of those self-contained organizations where everybody works—whose activities go on apace 24 hours a day every day in the year. It is but one of the many important features of railroad service that the passenger never sees but one so essential to modern railroading that a breakdown here would mean the disruption of operations to a great extent on some 700 miles of main line, chiefly between New York, Washington, Harrisburg and Pittsburgh. It handles an average of 200 trains a day, or a little better than four in and out every hour, the day's peak being reached between 3 and 8 p. m., when five to six arrive and depart each hour. With the exception of the hourly Philadelphia expresses during business hours, these are chiefly heavy limited trains, most of them with club, diner, observation and baggage or mail cars in addition to their lines of ten to twelve or more sleepers. In addition to its daily peak, the yard has week-end and holiday peaks.

When No. 28 reaches Sunnyside the 640,000-pound streamlined electric that hauled it at a ninety-mile clip on its last lap, is uncoupled and goes to the engine house for inspection, oiling and any adjustments or re-





Left—The wheel shop in Sunnyside Yard, showing a wheel turning lathe "turning down" wheels. Car wheels are "shaved" or turned down ⅜" at regular periods to insure smooth riding. Below—Supplying Pullmans with ice for cars that have no power air conditioners.



Above—A car-cleaning crew at work. Cars are cleaned thoroughly inside and out, even to the extent of washing the cars in oxalic acid. Right—J. J. McGann is Yardmaster at Sunnyside Yard, a job involving the solution to many problems that arise. He has a corps of experienced assistants.

pairs that may be necessary. Next it goes to the bunkering station to take on fuel and water just as the steamer does. The electric locomotive heats the train in cold weather from an oil-fired steam boiler, utilizing the standard heating equipment of the cars, as does the steam locomotive when it takes hold. So the next time you see the very latest thing in electric locomotives blowing off steam, don't be alarmed—it hasn't mistaken its ancestry and it doesn't carry a steam-driven plant to supply the juice that runs it—it's just a heating unit rarin' to be hooked on to its line of radiators.

Having been inspected, oiled and watered, the huge, high-speed power unit, almost as long as a modern sleeper, makes its last lap down the yard to be "sanded." More than a ton of fine-screened, baked-dry sand is shot over from the sand house by compressed air through pipe lines into its six sand bunkers and it's all set to go. The westerly switch tower, whose operator weaves the outgoing ends of any combination of the twenty-five to thirty miles of yard tracks into two departing strands at will, shunts it to the head of No. 29, and forty-five minutes in advance of the "all aboard" hour at the Penn Station, it once more dives under the mud and rock of the East River on its way west.

While the locomotive has been undergoing all this servicing what has happened to the train itself? The moment the engine pulls

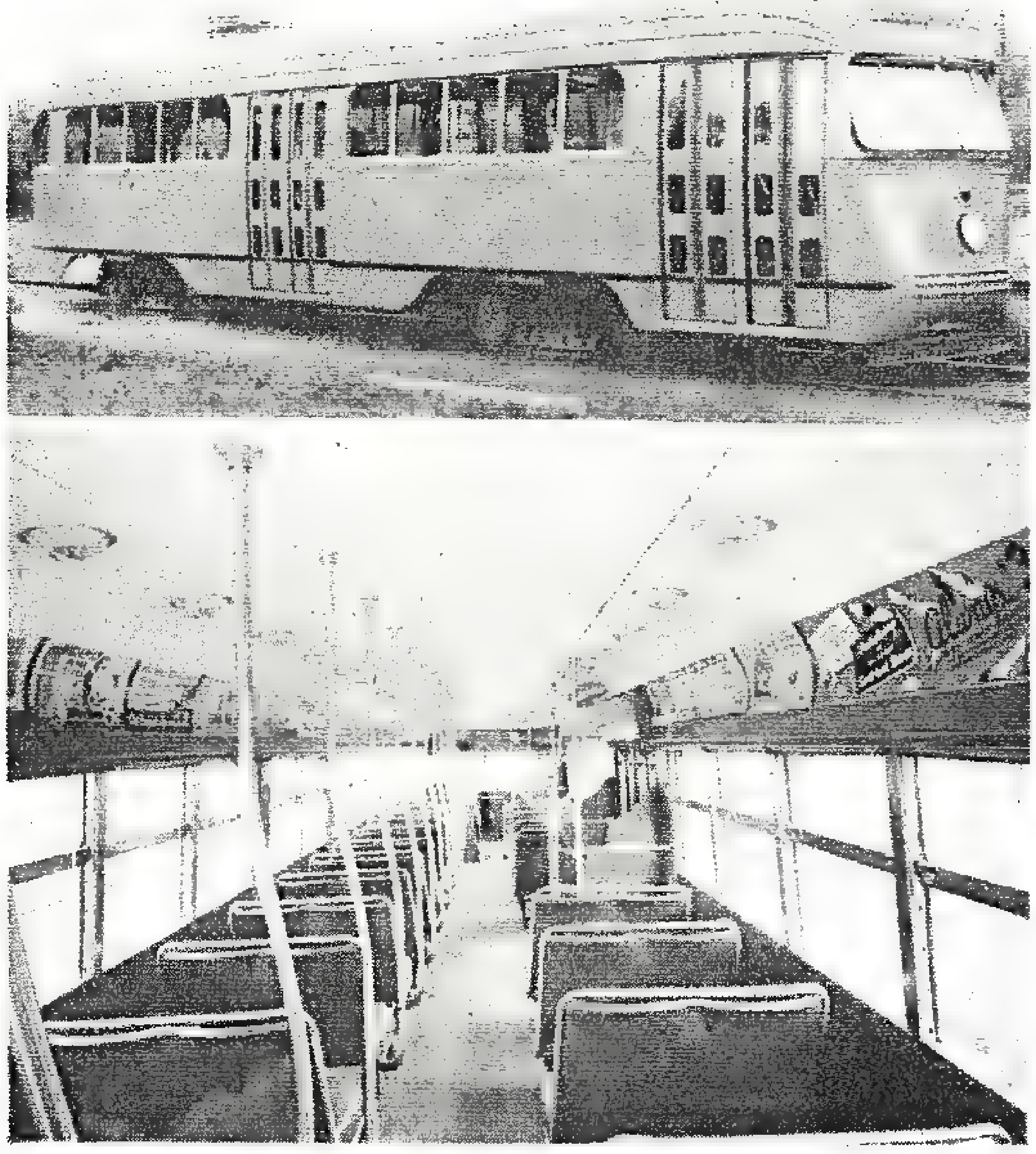
[*Continued on page* 128]

New Electric Cars Incorporate Unusual Features

EYE appeal, light weight, low first cost, low maintenance cost, and general passenger comfort are all incorporated in the new electric cars developed by the Electric Railway Presidents' Conference Committee. More than $750,000 and five years of effort were expended in developing the cars.

The cars, built by the St. Louis Car Co., of St. Louis, Mo., are equipped with special rubber mounted springs to insure freedom from noise and vibration. To give faster acceleration and retardation, new types of controls, motors, and brakes were developed. Light weight General Electric and Westinghouse motors power the 58-passenger cars.

Comfortable seats, good lighting, and a combined heating and ventilation system that takes air in from the roof of the car, warms it, and distributes it through ducts throughout the length of the car add to the passengers' comfort. The cars are 46 feet long, 8 feet, 4 inches wide, 10 feet high, and cost about $15,000 each.

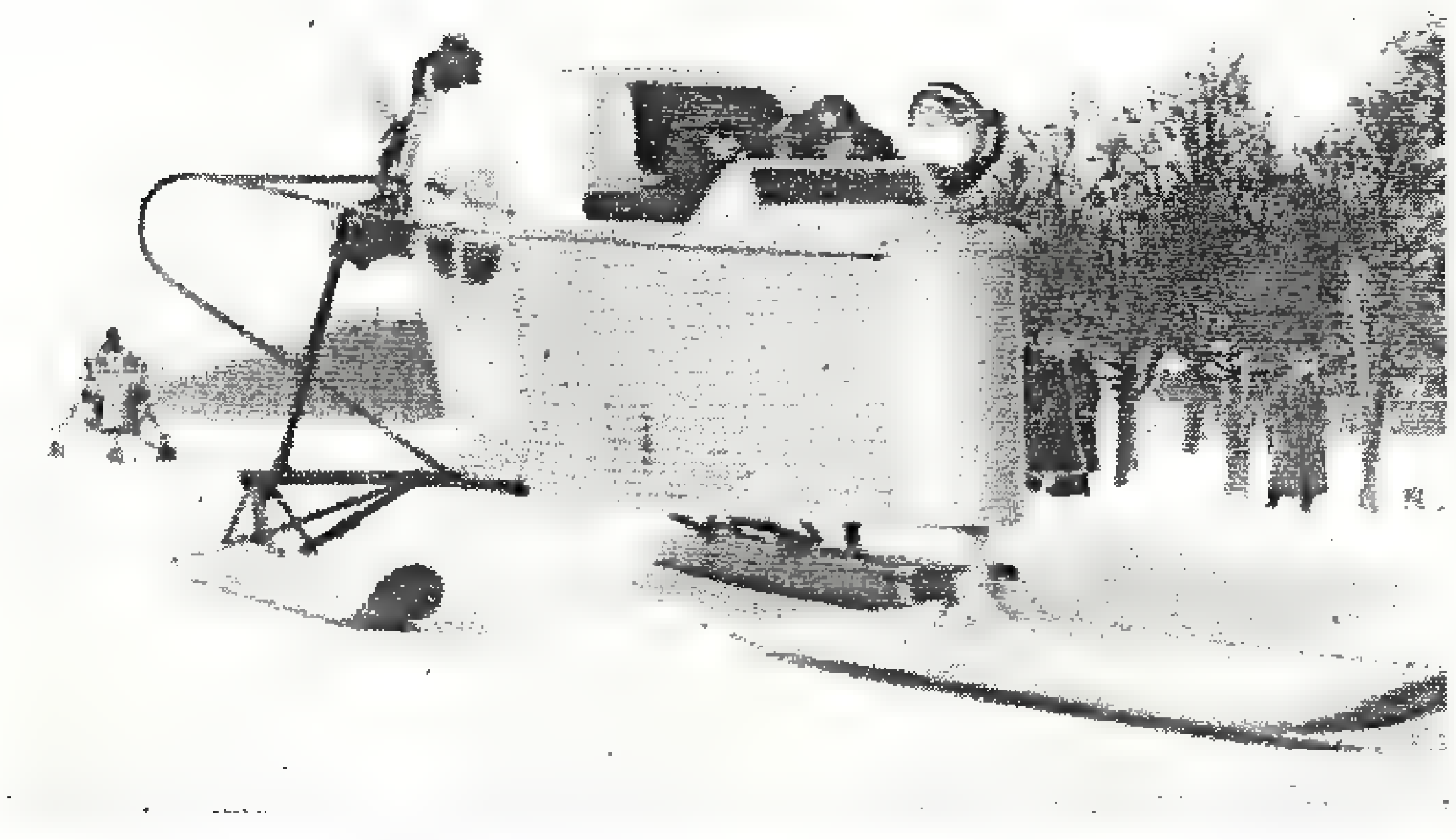


Top—Exterior view of the new electric car developed by Electric Railway Presidents' Conference Committee. They start and stop quicker, can speed at 50 m.p.h., and are fitted with three brakes—dynamic, magnetic and air. Bottom—Interior view of the car showing the seating arrangement

Snow-Sleds Patrol Border

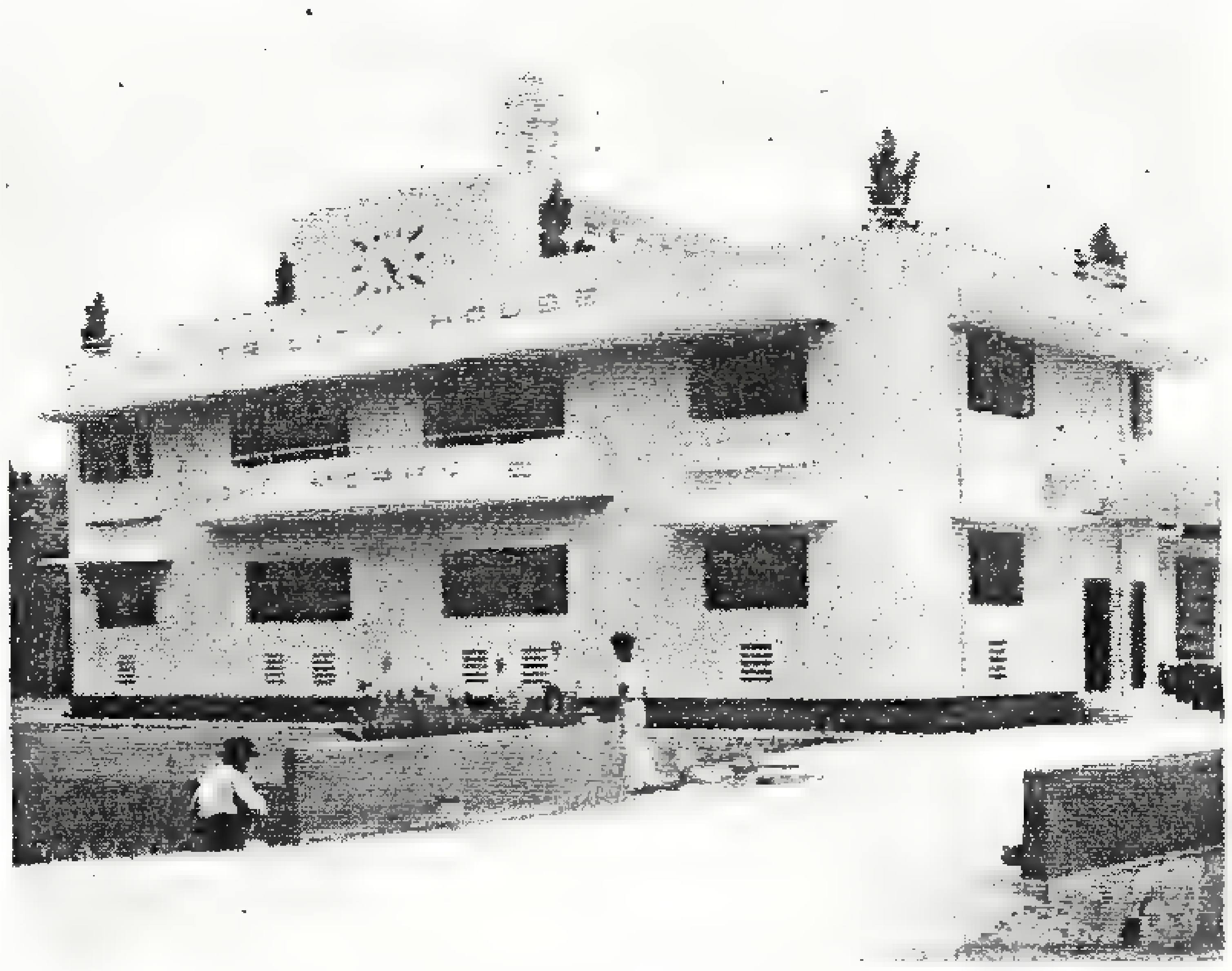
SNOW-SLEDS powered by airplane engines and propellers are used to patrol the border regions of Soviet Russia. The sleds are of the pusher type, having the engine mounted at the rear.

The bodies of the sleds are semi-streamlined and constructed from a lightweight corrugated metal. A nose cockpit seats a driver and a guard, and a small aft cabin protects two relief soldiers from the cold. A searchlight aids night driving.



Metal snow-sleds like this one are used to patrol the borders of Soviet Russia. They are powered by airplane engines and propellers and attain speeds not possible with autos.

Building Has Glass Exterior



The outer surface of this concrete office building in Singapore, Malaya, is finished with plaster and broken glass particles. Floodlighting makes the building gleam brightly at night.

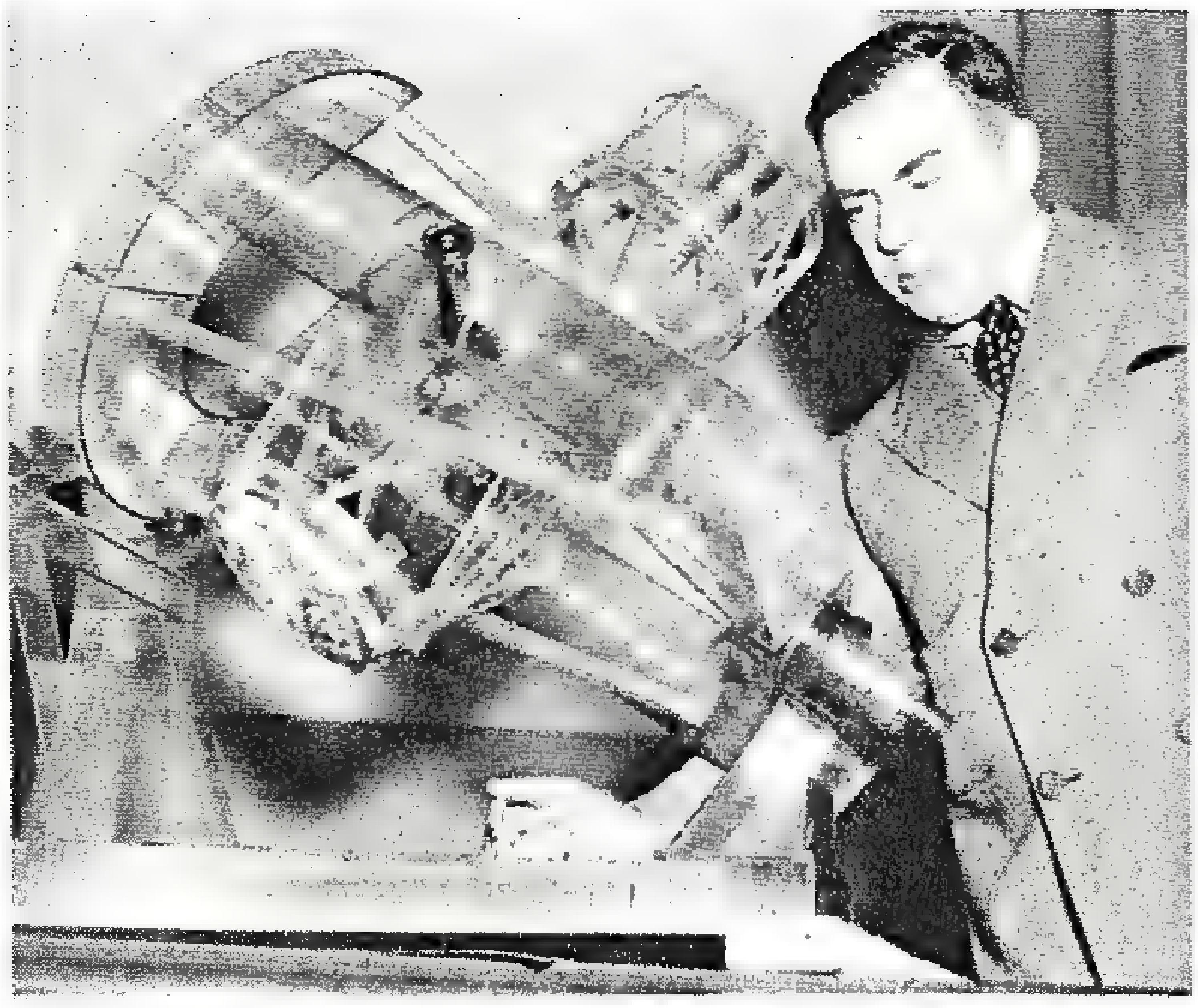
IN ORDER to attract attention to their office building, a firm of electrical engineers in Singapore, Malaya, had the exterior finished with a mixture of plaster and broken glass. In the gleam of floodlights at night the particles of broken glass produce a brilliant lustre, creating a novel effect.

During daylight, the sun sparkles on the glass particles attracting the attention of all who pass. The concrete building is modernistic in design.

Transparent Telescope Model Shows Construction

A TRANSPARENT model of the 200-inch telescope which the California Institute of Technology will erect on Mount Palomar by 1940 was used to illustrate a lecture on its construction before members of the American Institute of Electrical Engineers and the Amateur Astronomers Society in Philadelphia, Pa. Capt. C. S. McDowell, of the U. S. Navy, who will supervise the construction of the telescope, conducted the lecture.

The model was built to scale, being three feet high as compared with the proposed telescope's 75 feet. The huge telescope, with its 200-inch lens, will cost approximately six million dollars when completed.



To show the comparative size, Capt. C. S. McDowell, U.S.N., indicates figure of man beneath transparent model of huge 75-foot telescope he is building for California Institute of Technology to be erected atop Mount Palomar, Calif., by 1940.

Devise Tiny Walking Radio

COLUMBIA
CBS

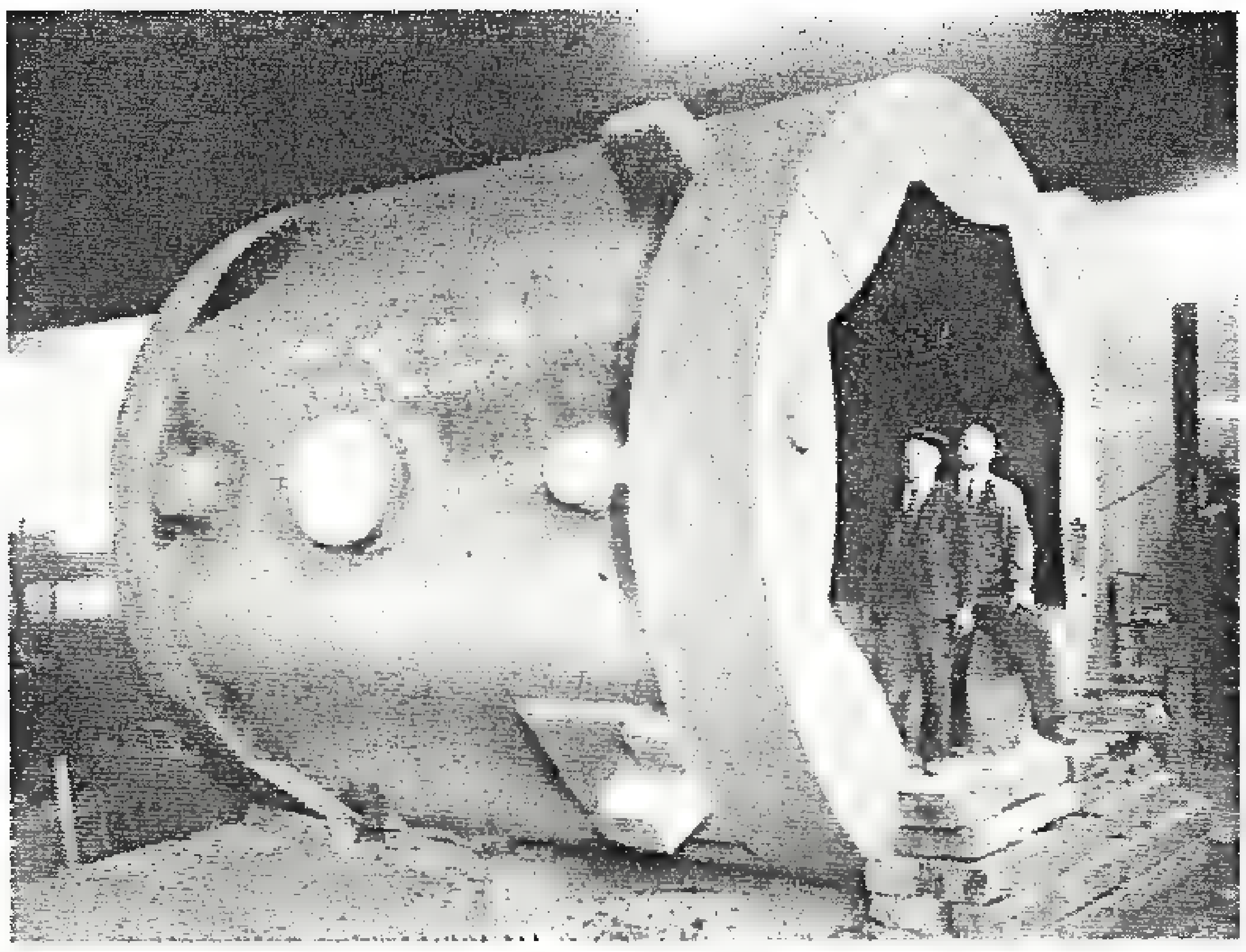
Bob Trout, CBS announcer, demonstrates the tiny walking transmitter used for conducting roving interviews. Its parts are concealed in cane, wrist strap, money belt, and binocular case.

A NOVEL radio transmitter is used by representatives of the Columbia Broadcasting System to conduct roving interviews. The device consists of an antenna and radio frequency oscillator mounted in a cane, a microphone on a wrist strap, batteries in a money belt, and an audio amplifier and modulator in a binocular case. Working range is one mile.

Transport Huge Ingot Mold

CONSTITUTING the biggest single load ever moved by railroad in Britain, an ingot mold weighing over 150 tons was transported along a special route to avoid bridges which might have collapsed under weight of huge mold. An escort of mobile police accompanied the freight train along the route which was selected by the Sheffield City Engineer.

Made by the Brightside Foundry and Engineering Co., Ltd., the mold is 13½ feet long and 12 feet wide. It will make possible the casting of ingots weighing more than 200 tons. Previously, the largest ingots made in England were 175 tons in weight. The mold was made for use at the Atlas Works, in Sheffield, England.



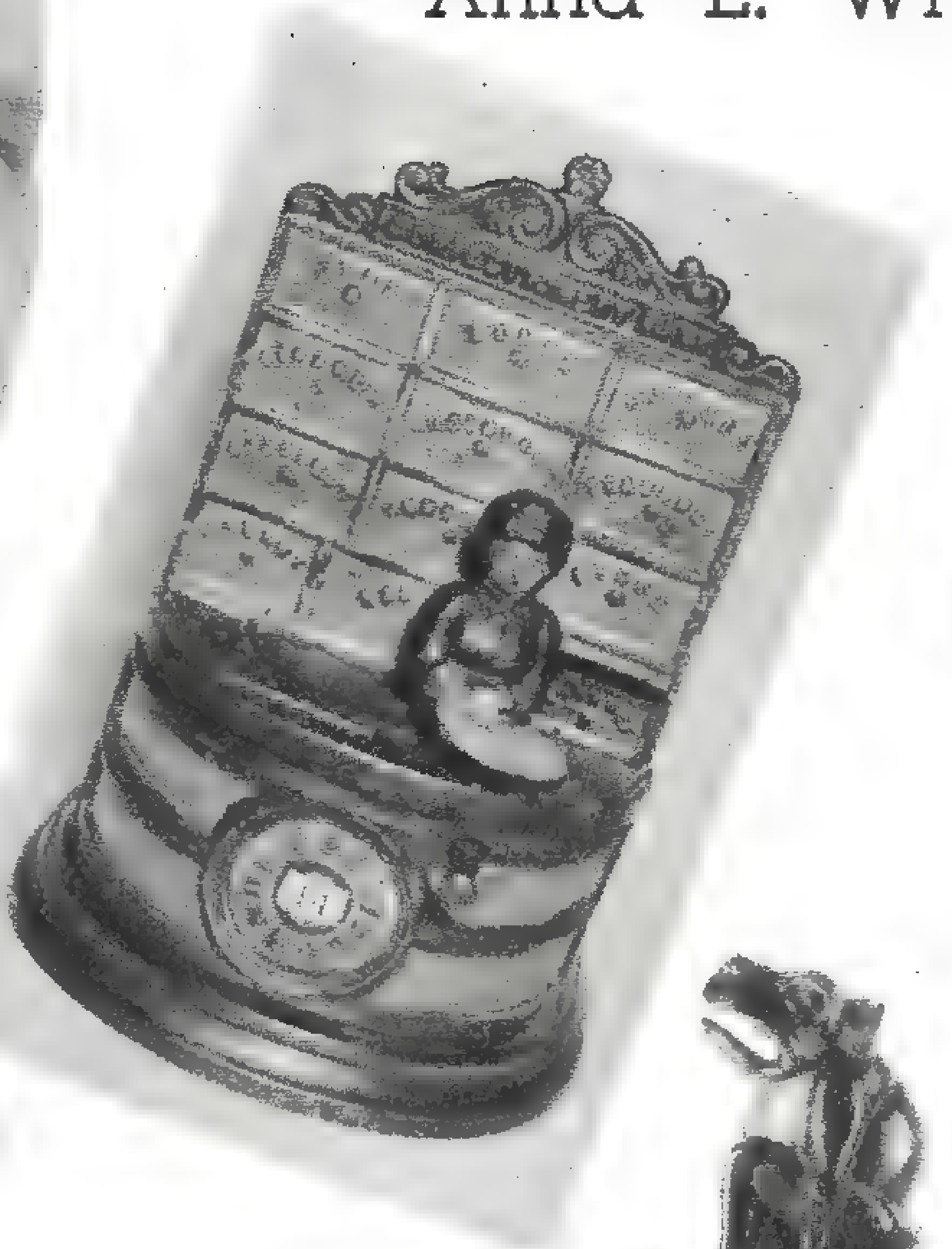
Weighing over 150 tons, 13½ feet long and 12 feet in diameter, this ingot mold is said to be the largest in the world. It constituted the biggest single load ever hauled by rail in England and necessitated special rating of freight train.

COLLECTORS VIE

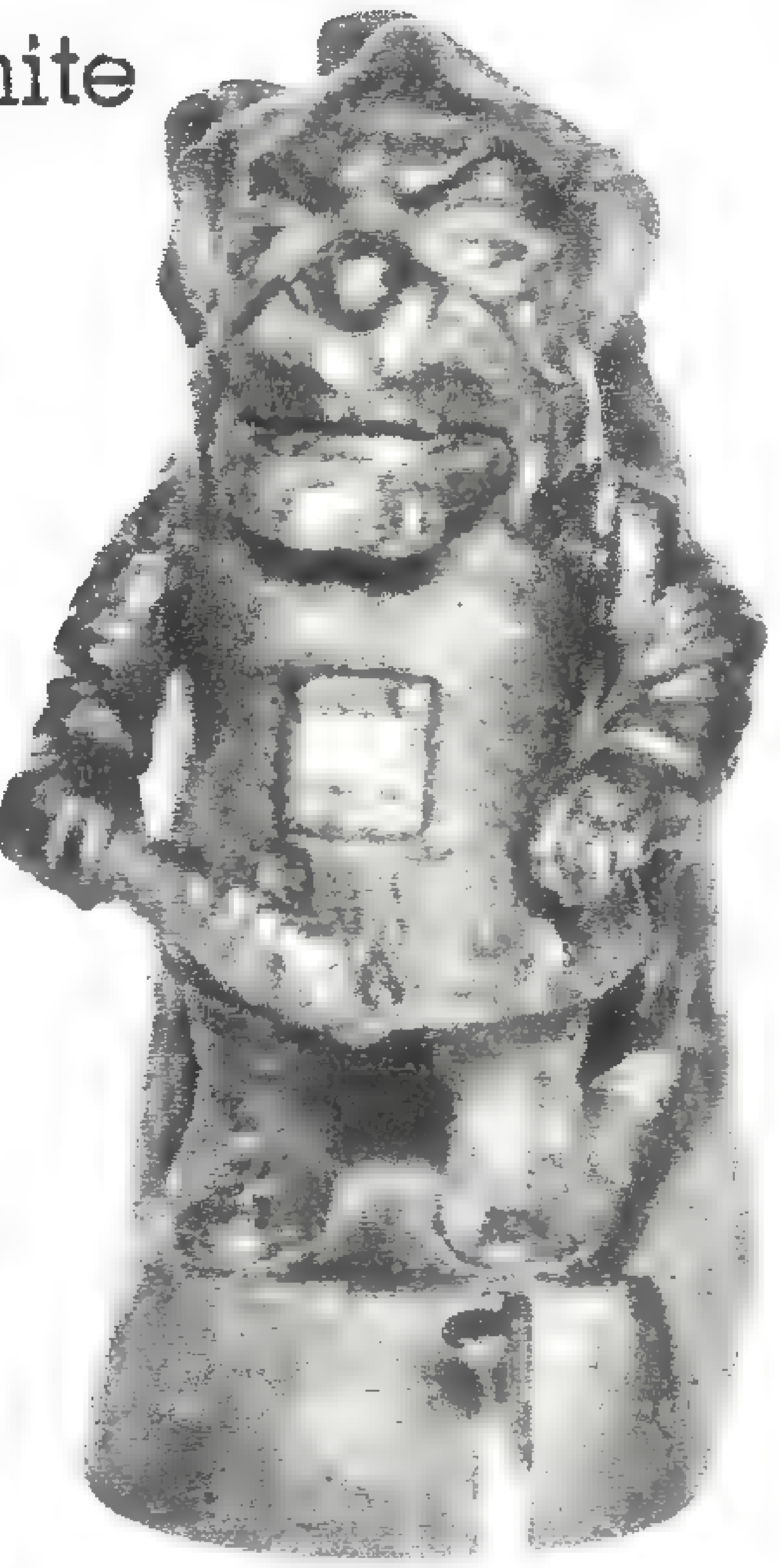
Weird and amusing coin devices of last century are now rated real "Americana" by the connoisseurs.

by
Anna L. White

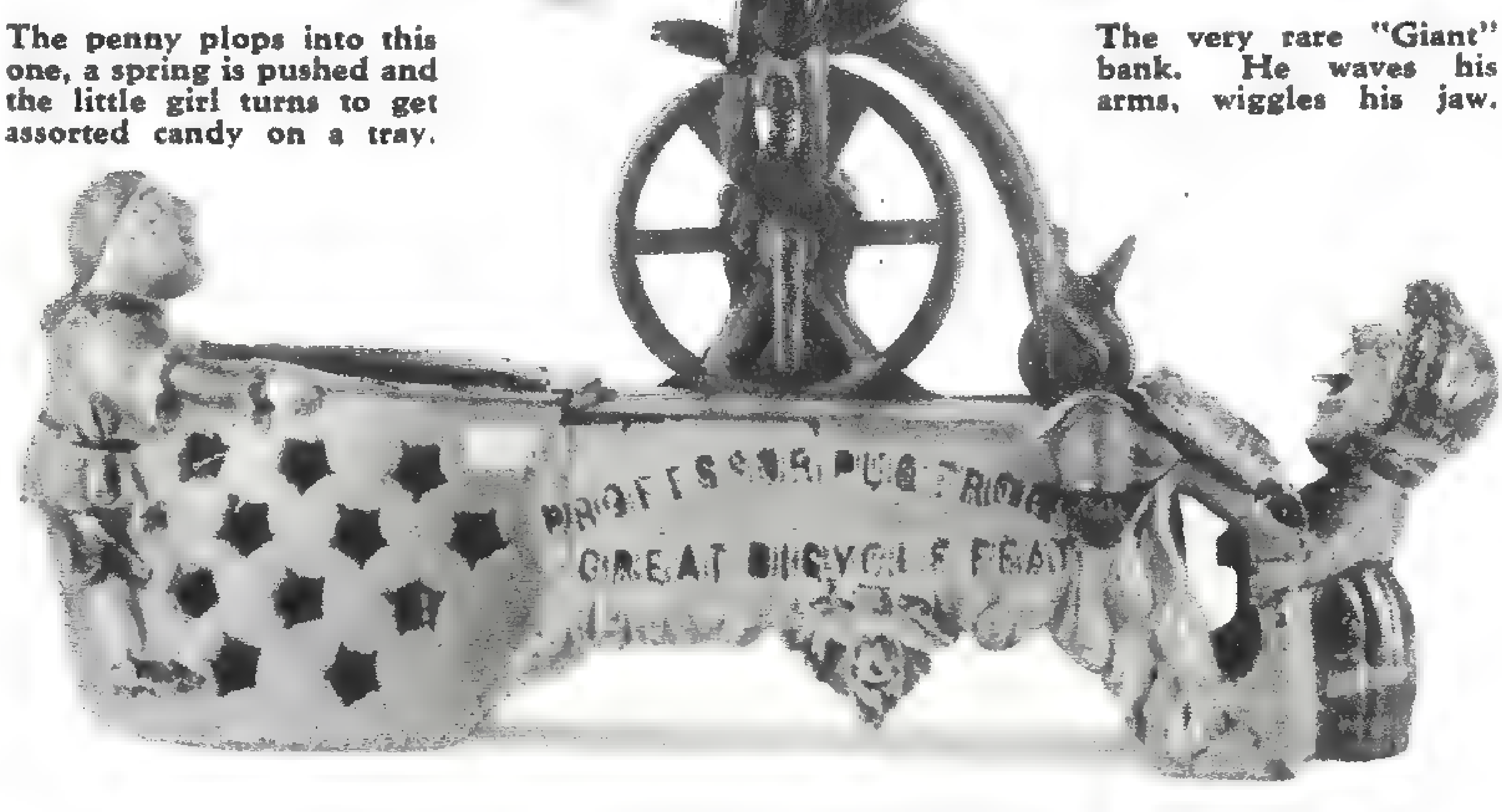
Elmer Rand Jacobs, vice-president of Seamen's Bank for Savings in New York, who is a leading collector of penny banks, now classed as "Americana." Three prizes in his collection are shown in this page.



The penny plops into this one, a spring is pushed and the little girl turns to get assorted candy on a tray.



The very rare "Giant" bank. He waves his arms, wiggles his jaw.



"Professor Pugfrog's Great Bicycle Feat." In this bank the wheel spins and tosses the coin into the basket held by the laughing clown.

JUDGING from the number and variety of small coin banks made during the 1800's we might conclude that saving pennies was the chief indoor sport of the last century. Coin banks were made in tin, iron, brass, wood, leather, glass, pottery, and even silver and pewter, fashioned into all manner of shapes—crude, unique, or beautiful. Now these little banks are classed as "Americana" and are being eagerly sought by collectors.

This fad is of comparatively recent origin, and among the first enthusiasts is Elmer Rand Jacobs, vice president and comptroller of the Seamen's Bank for Savings in New York City.

One of the prizes of Mr. Jacob's collection is the very rare "Giant" bank. This giant moves both arms and jaw. Another is the confectionery store bank, representing boxes of candy on shelves. When a spring is operated a girl turns around and receives candy on a tray. One peculiar bank is a wind-up mechanical device in which a savage dog

for PENNY BANKS

jumps at a man and seizes the coin which he holds in his hand.

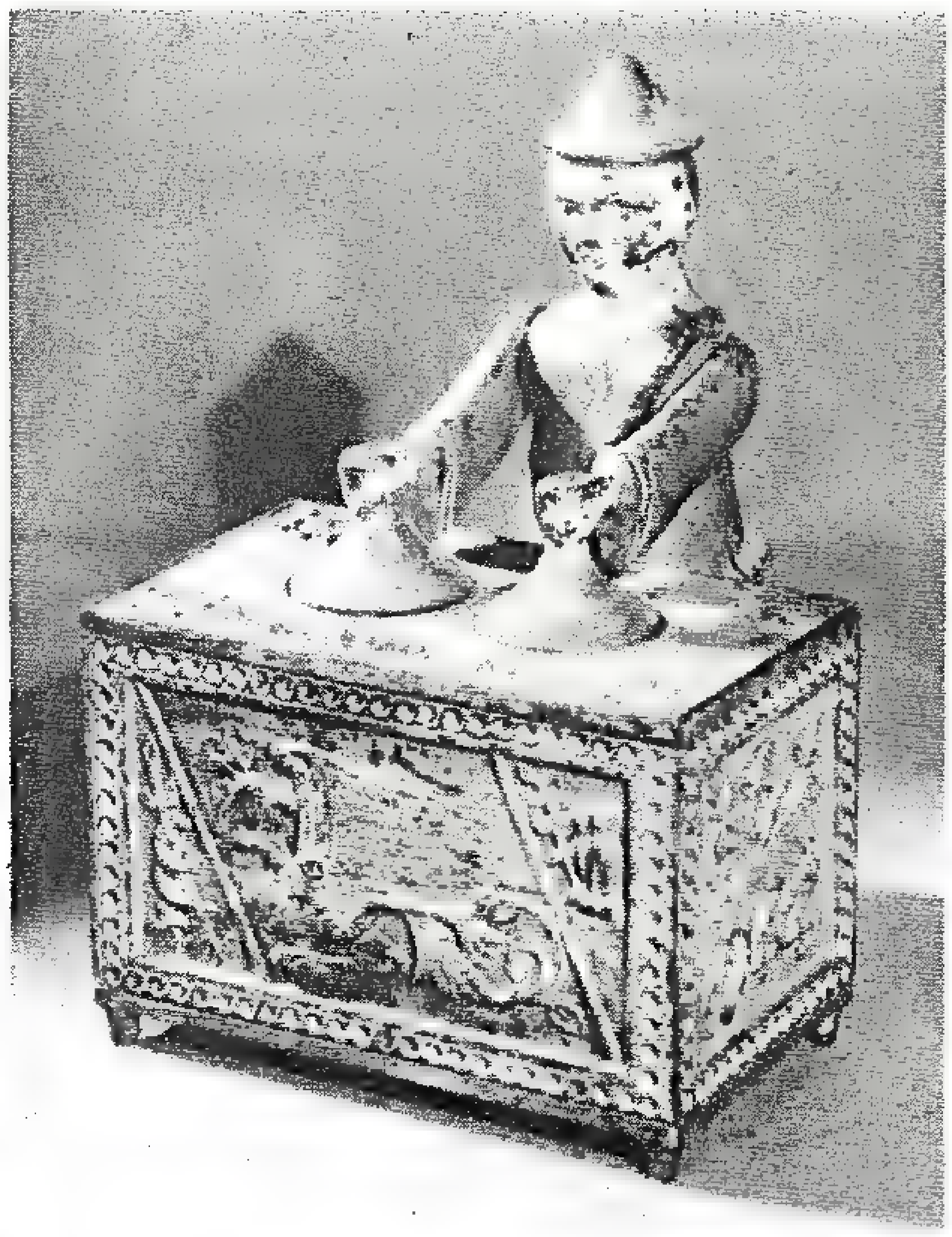
In his travels Mr. Jacobs is always on the lookout for new and unusual specimens. While in Mexico he picked up several banks made in recent years but carefully imitating the old Aztec designs in calendar stone. Another bank is of Spanish origin.

Mr. Jacobs has had printed an illustrated list as a guide to those interested in looking at the collection of juvenile banks on permanent display at the Seamen's Bank, and he maintains that he has made more converts to the hobby than anyone else. Although he disclaims the honor of being the first collector of these banks, he is one of the pioneers.

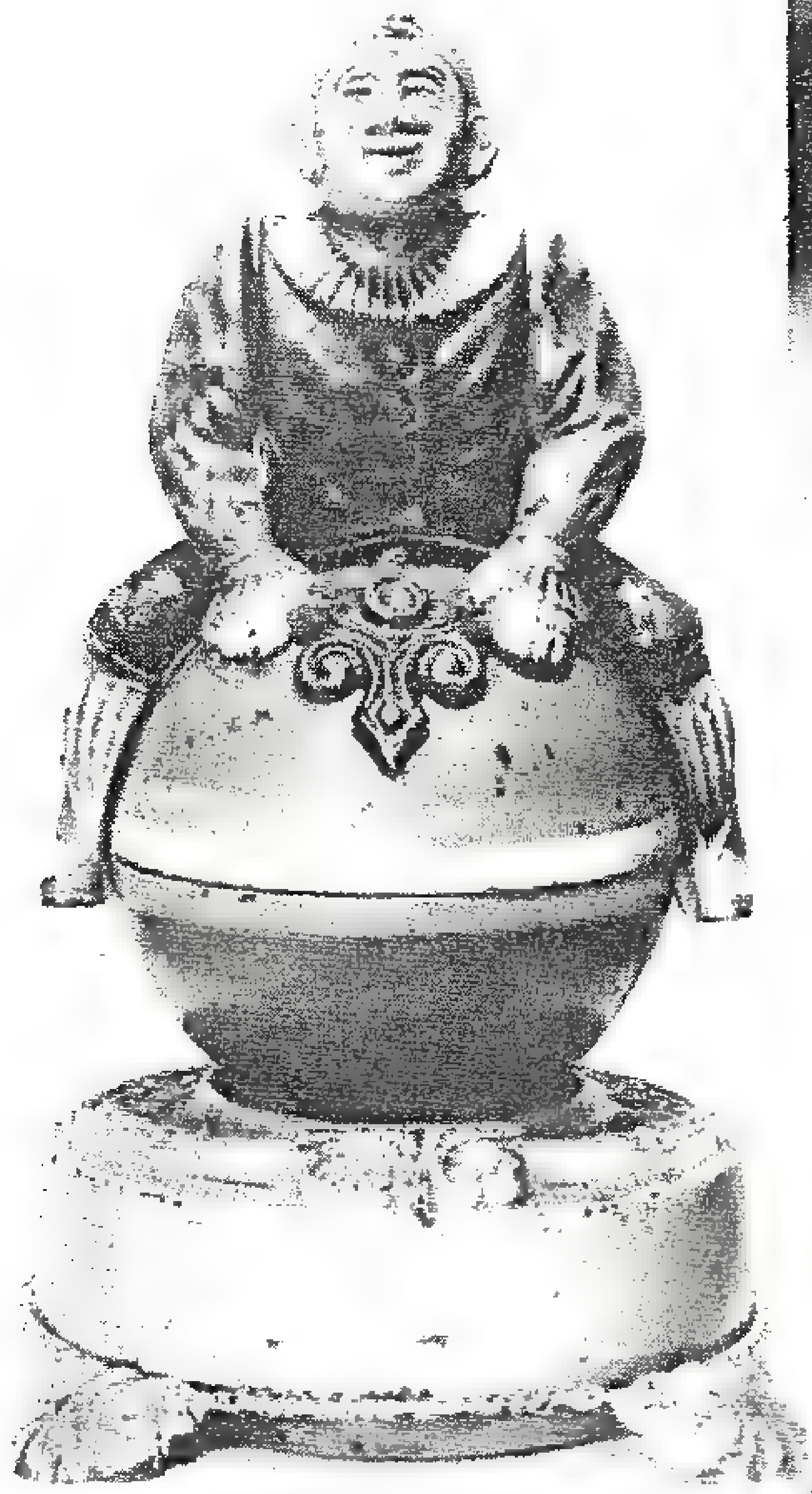
Another pioneer collection is to be found at the Boston Five Cents Savings Bank. This consists of 172 banks, many of them mechanical, some of them rare, which were collected by Wilmot R. Evans, former president of the bank, and which came to the bank through his estate.

The third of the triumvirate of pioneer collectors is Andrew Emerine, of Fostoria, Ohio. Mr. Emerine has a very good collection of both mechanical and non-mechanical banks, among them the "Girl Jumping Rope." In this bank the coin is inserted in a slot, and when a lever is pressed the girl jumps rope, moving head and feet and causing the coin to fall into the bank. Another interesting bank in Mr. Emerine's collection is the "Circus Bank," in which a clown drives a cart and horse around a ring.

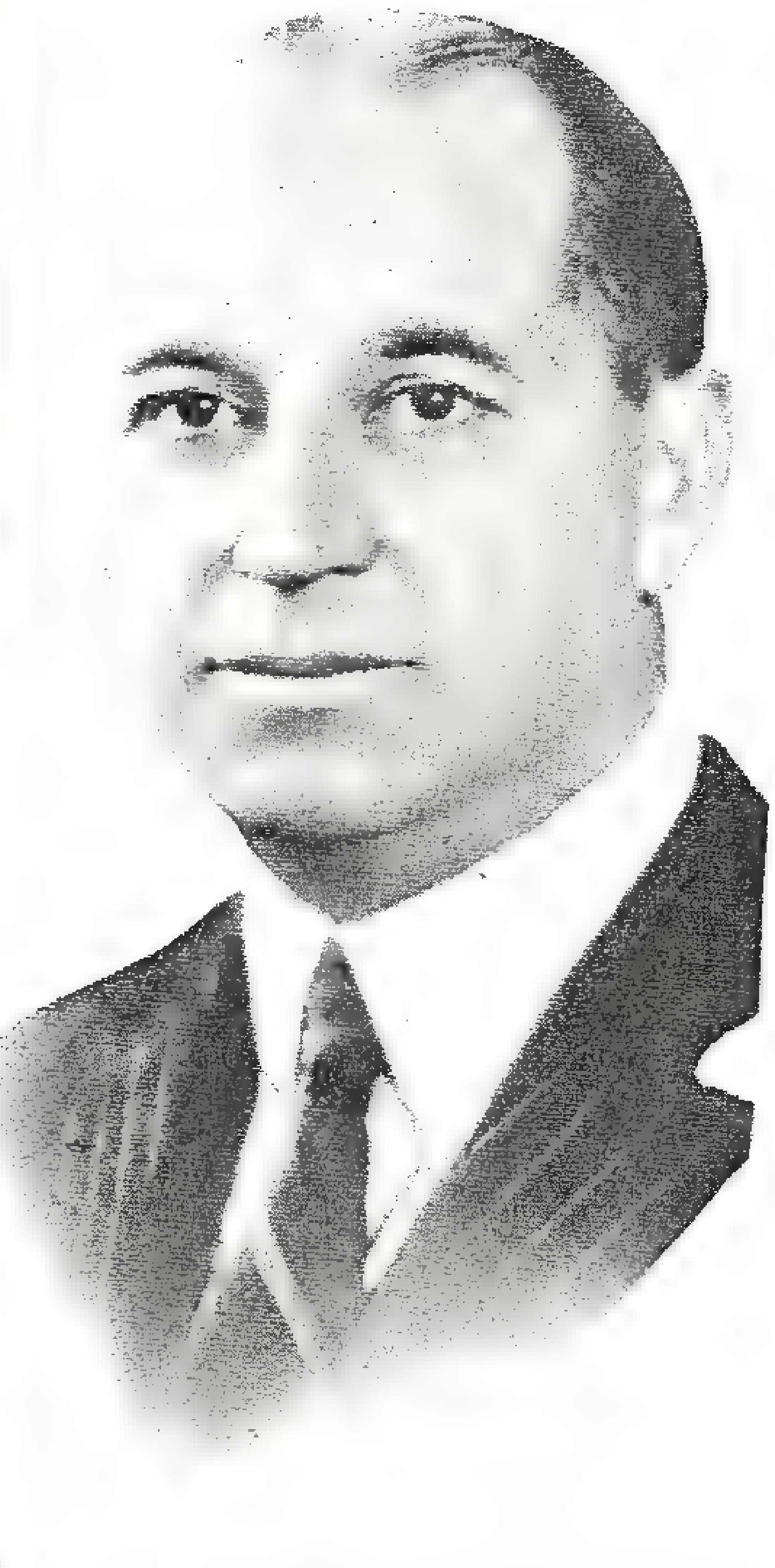
Another Ohio collector is James C. Jones, of Cleveland Heights, who has some interesting and rare mechanical banks. One of these, the "Mikado" bank, was designed to take the

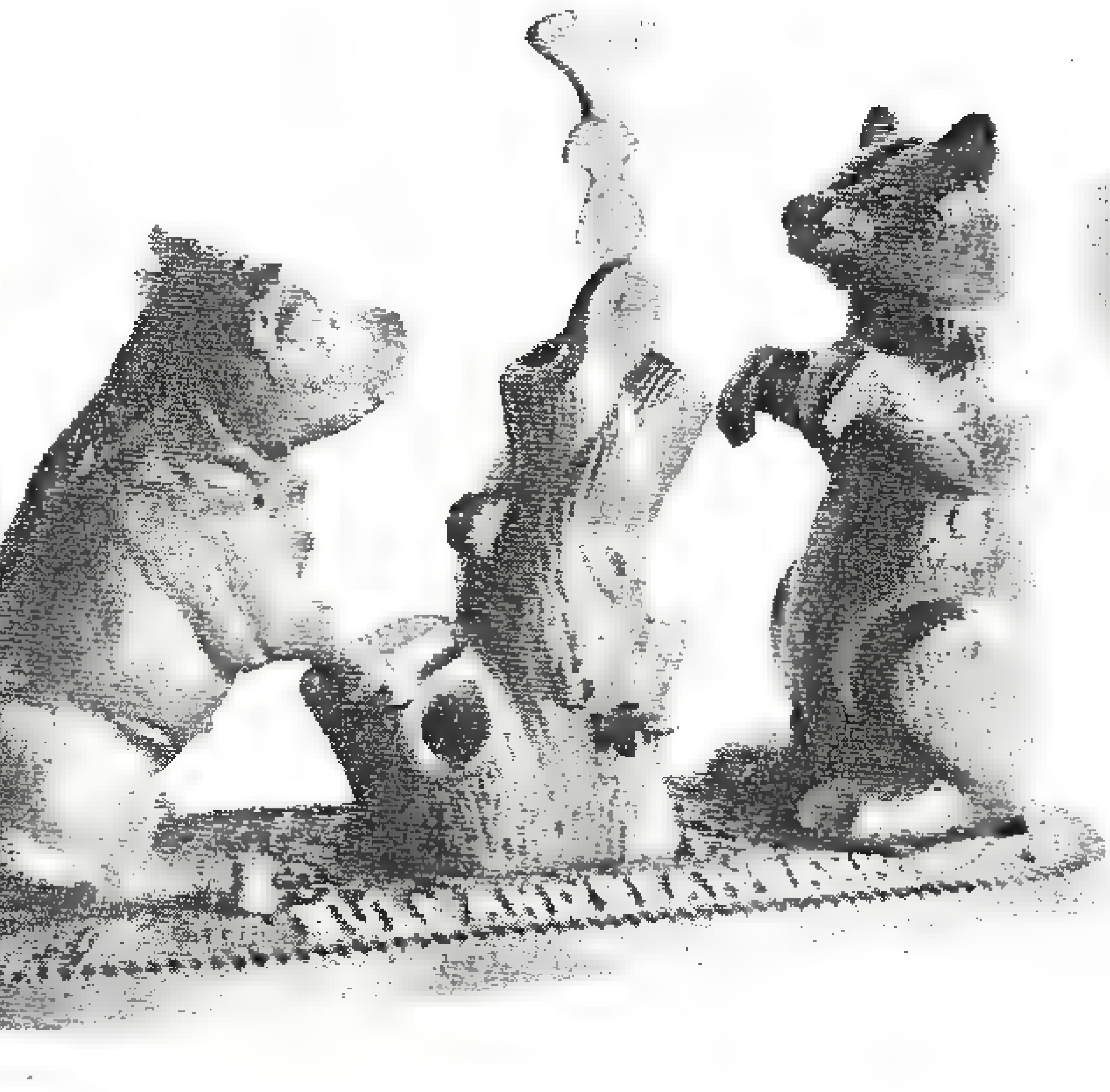


The "Mikado Bank" in collection of James C. Jones of Cleveland Heights, Ohio. The figure hides the penny, like a shell game artist, and makes it vanish.



The clown stands on his head and the globe revolves when penny is put into this rare bank owned by Dr. A. E. Corby, who has one of the largest collections.

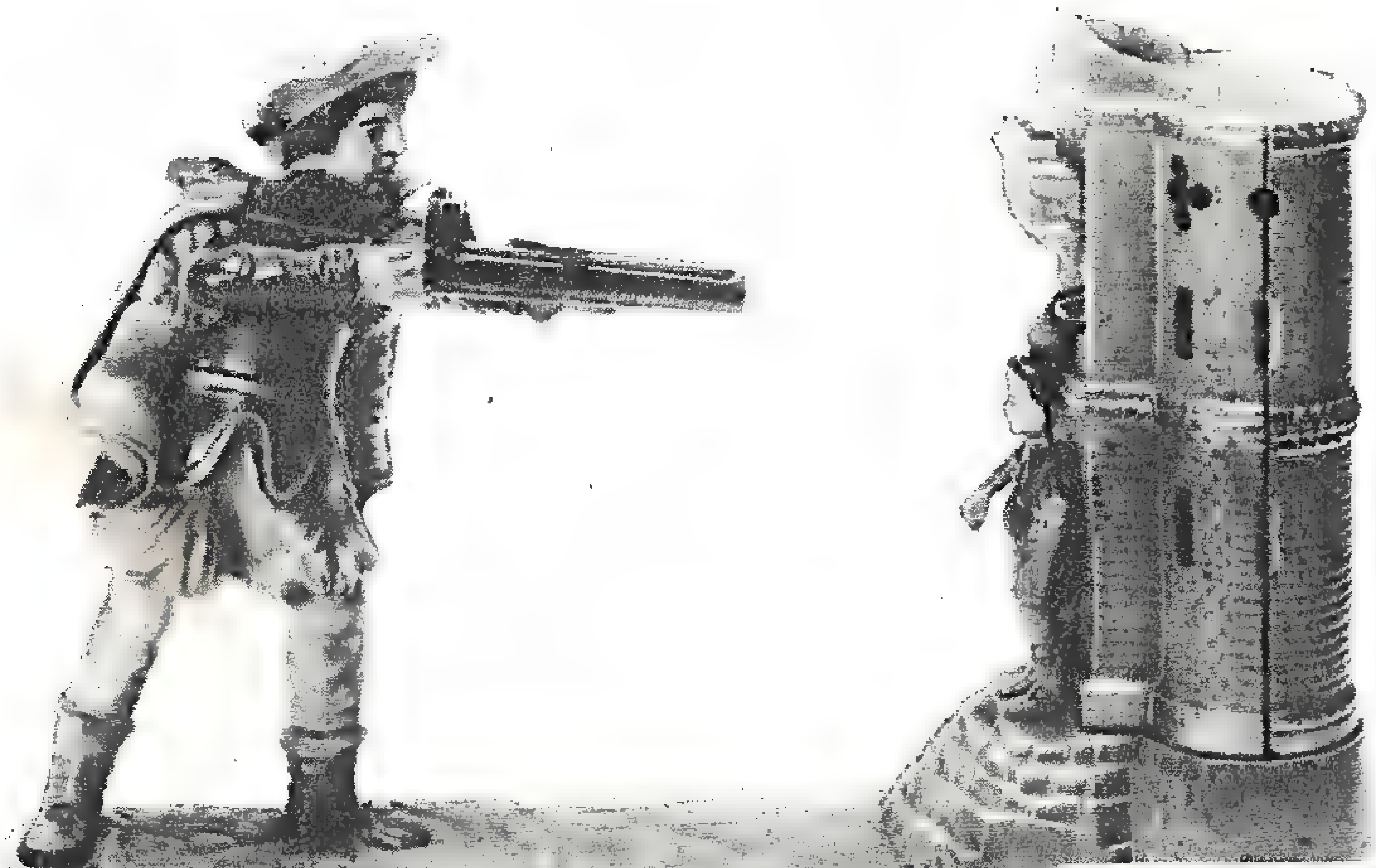




Walter P. Chrysler, an avid collector, and his "Bull and Bear" bank, left. When coin drops, the indicator swings to either bull or bear, suggesting which way the market is liable to go.

old-style large copper penny, and represents a Japanese man behind a large chest. It is operated by turning a crank in the back of the figure, which moves its arms up and down alternately. The penny is placed under the cover of the right hand and, when the crank is turned, this cover goes down and the left one is raised. Then the operation is reversed and the penny disappears into the chest. In another bank, "Patronize the Blind Man and His Dog," a coin is placed between the hands of the blind man, and the dog travels along the curved track, takes the penny in his mouth as he passes the man, and deposits it in the receptacle.

Many antique shops attempt to meet the demands of collectors. Norman Sherwood of Asbury Park, N. J., who deals exclusively in these banks, has devoted much time and study to their history and background and is an authority on their value.



William Tell, in this bank from the Corby collection, fires penny, placed on his gun, at the apple on the boy's head. Lower photo is part of the pioneer collection of Andrew Emerine of Ohio.

These little banks cannot actually qualify as "antiques," as the earliest dates for any of the American banks are not further back than 1840. Probably the first juvenile banks used in this country were brought from England and Europe. The earliest banks made in America were of tin, many of them by a Connecticut firm, established in 1810 at Durham, which began making tin banks in the 1840's.

A little later iron banks were made, and much more care and workmanship appears upon them. An interesting series of coin banks made of iron are little toy safes. Some of these models had real combination locks.

The largest manufacturer of juvenile banks was the J. and E. Stevens Company of Cromwell, Conn., established in 1843. Old catalogues of this company list 21 mechanical juvenile banks now highly valued by collectors, besides about 30 non-mechanical banks and safes. Other manufacturers of small banks were the Sheppard Mfg. Co., of Buffalo, N. Y., and the Kenton Hardware Co., of Kenton, Ohio.

The first juvenile banks in general use were non-mechanical, sometimes termed by present day collectors as "dumb" banks. It is estimated that there are several hundred types of these now in existence. Good authorities claim that altogether around 200 different types of mechanical banks were made. A few mechanical banks are quite early in date, some as far back as 1862, but roughly speaking, they were manufactured in quantities mostly between the years 1869 and 1906, then demand for them waned. The height of their popularity and use seems to have been in the 80's.

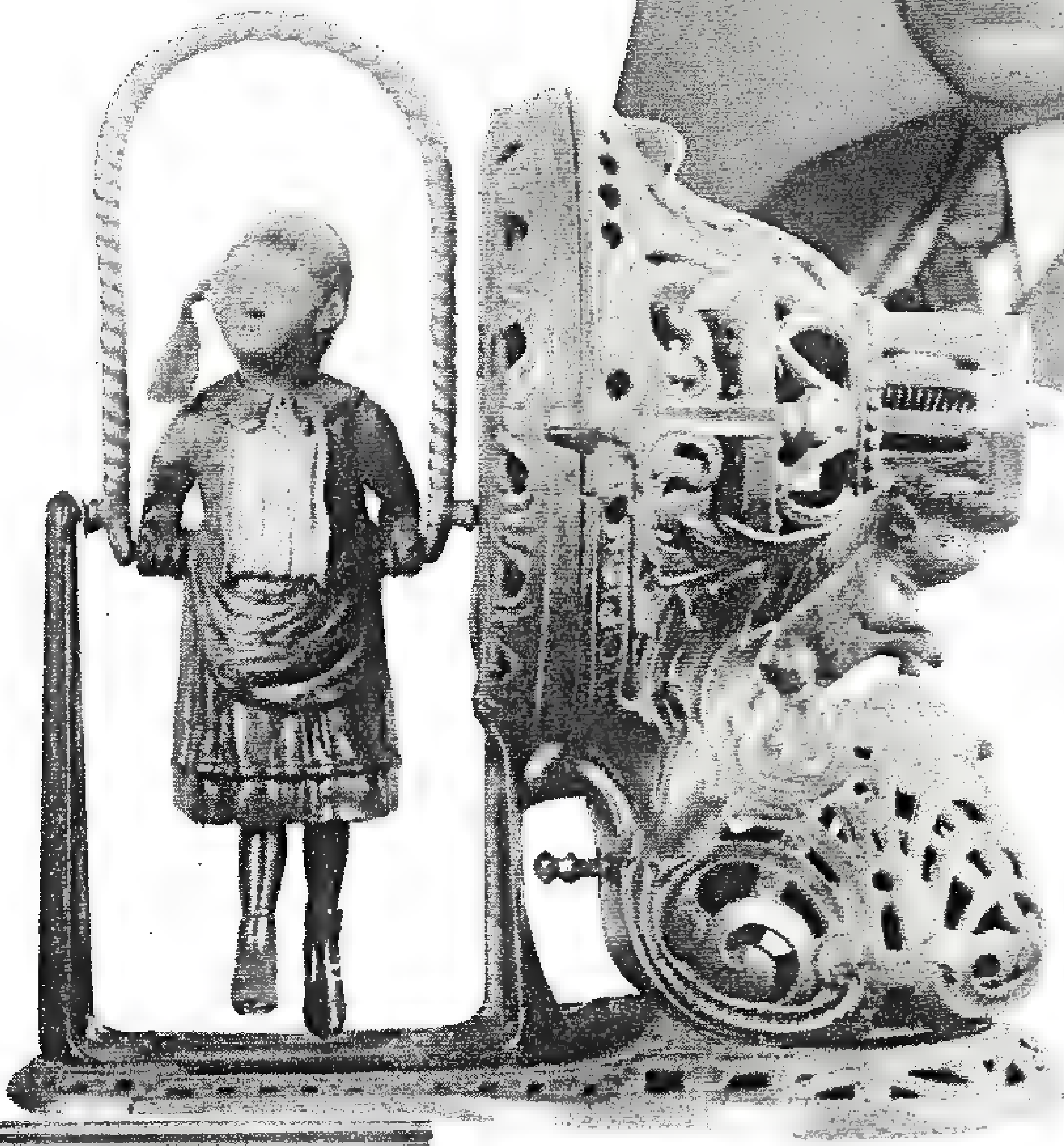
There are a few instances of these juvenile banks

being distributed for advertising purposes in the 90's and later, but generally they were offered for sale in the stores at prices ranging from $1 to $2.50, and were bought by parents and fond aunts and uncles as Christmas and birthday presents for the children.

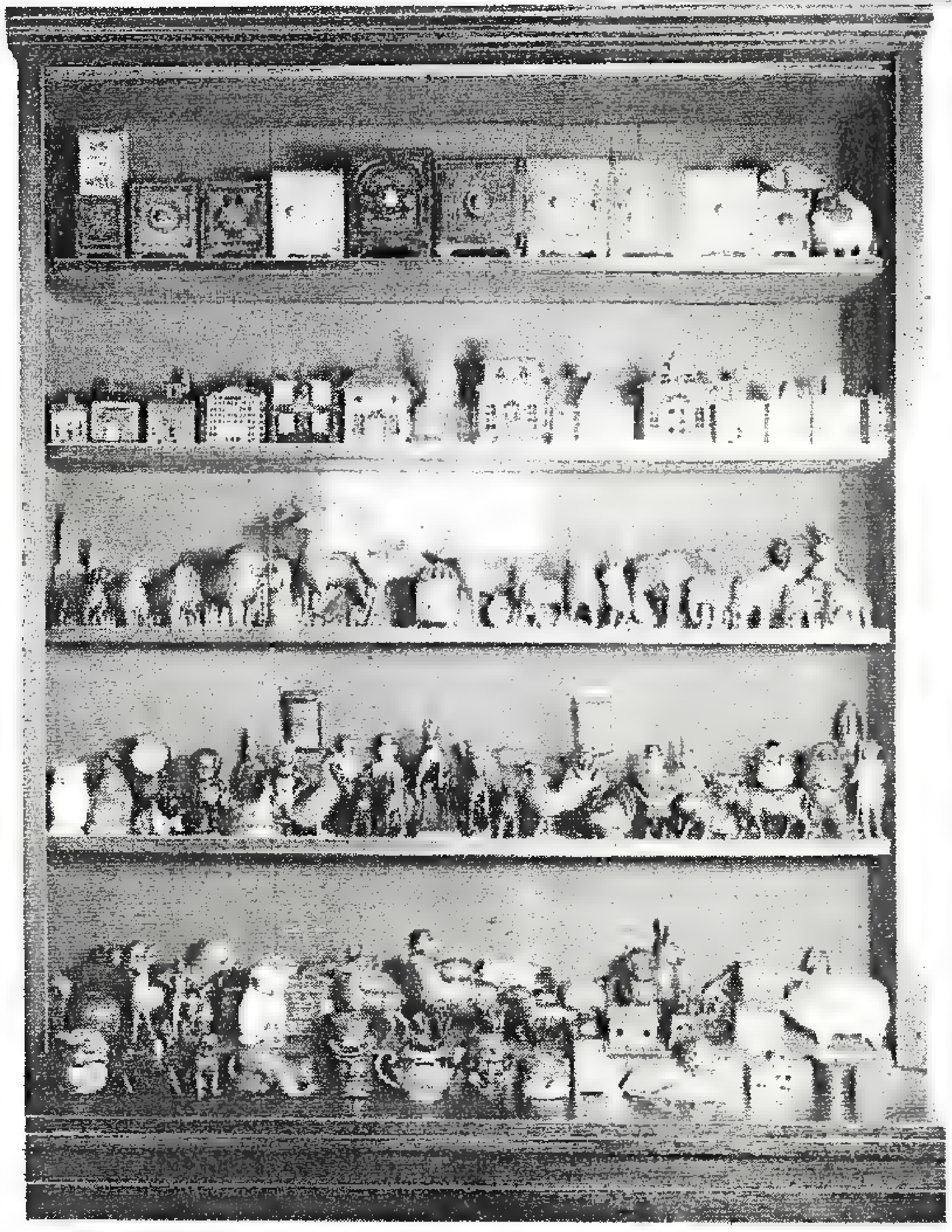
All sorts of animals were popular as models for banks—dogs, owls (indicating wisdom), and barnyard fowls. A type of bank that seems to have had wide popularity is shaped like a pig. There are pig banks of all kinds and descriptions and are too numerous to be highly valued by collectors.

It is perhaps hard to understand the significance of a pig in banking circles. The squirrel has more meaning as it suggests thrift. Several types of squirrel banks are in existence, among them one with a squirrel which, at the pressure of a spring, flips a coin into an opening in a stump. The words, "Save as the Squirrels" are imprinted on the standard.

Andrew Emerine, of Fostoria, Ohio, third in the triumvirate of pioneer collectors of penny banks of the last century, which hobby now gives promise of becoming popular fad of the Nation.



Deposit of penny in this antique made the little girl so happy she merrily skipped rope.



With this collection, Andrew Emerine of Fostoria, Ohio, could build tiny town with people and houses, or stage a circus parade with the animals.

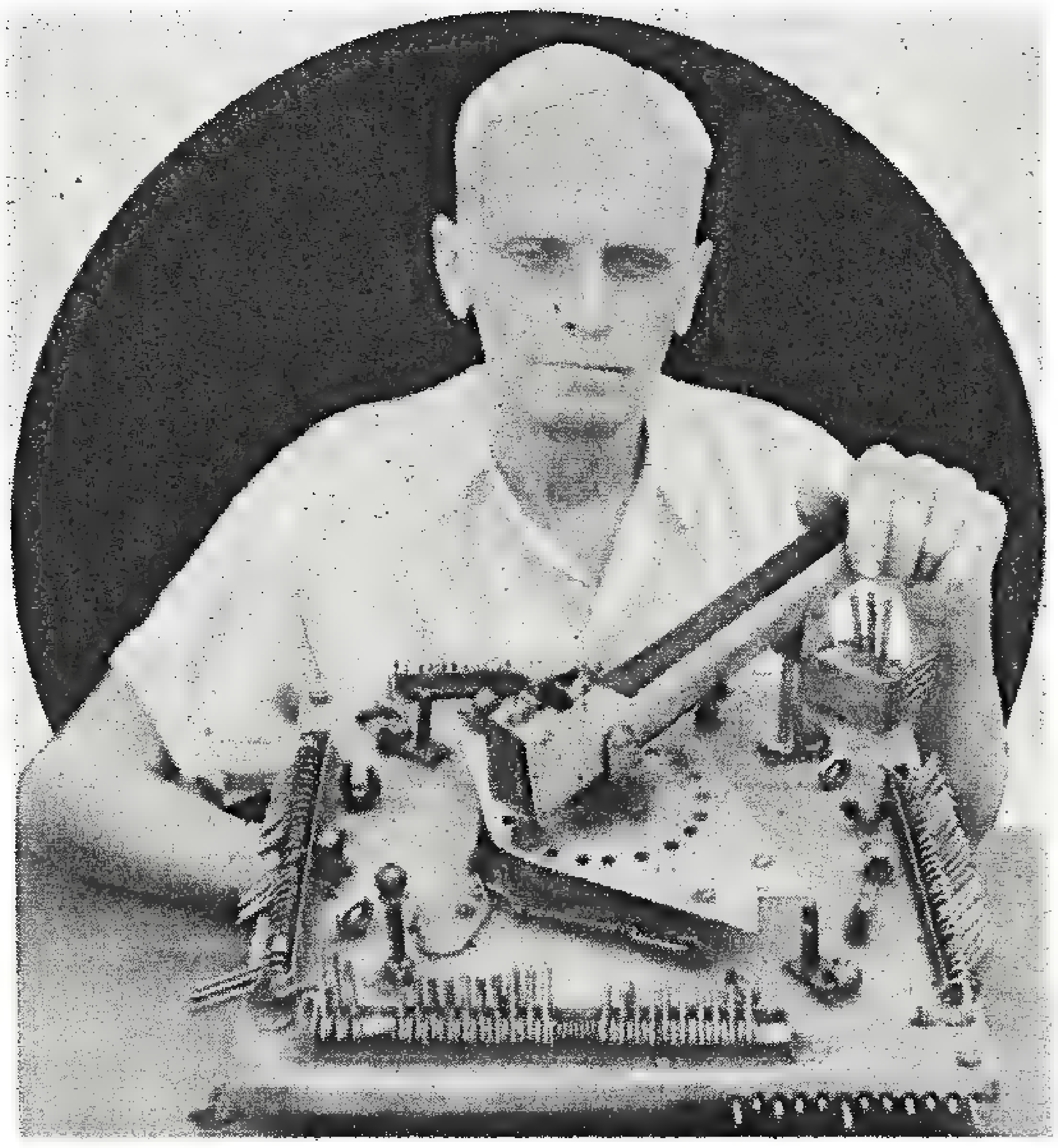
Many coin banks are replicas of public buildings and houses. Some are in the shape of human heads, either natural or grotesque.

When it comes to the grotesque, one bank in the collection owned by Dr. A. E. Corby, of New York City, is undoubtedly the only one of its kind. This is the skull of an Indian which somebdy found out West, polished and stained a dark brown and, by putting a slit in the top of the head, made it into a bank. When Dr. Corby obtained this somewhat gruesome bank, it contained 700 Indian head pennies.

Dr. Corby has one of the largest and most important collections of juvenile banks, both mechanical and non-mechanical—about 2,500 in all—some of them very rare. He has one whole shelf containing small coin banks of which there is only one of a kind, so far as is known. The prize bank in this collection is really a museum piece valued at several hundred dollars. It is dated 1855 and is made

[*Continued on page* 130]

Blind Man Invents Novel Baseball Gameboard



All the thrills of the baseball diamond can be reproduced by this mechanical gameboard invented and built by John W. Bushaw, 72. He is a blind metal worker in Tampa, Florida.

ALTHOUGH totally blind for 13 years, John W. Bushaw, 72, of Tampa, Fla., enjoys all the thrills of the baseball diamond through the use of an ingenious mechanical baseball game he invented. Two or more persons can play the game and all the strikes, balls, fouls, runs, hits, and errors of the real game can be duplicated on the mechanical board.

The game was constructed entirely by Mr. Bushaw at his workbench. His knowledge of metal working acquired before his affliction has enabled him to turn out, purely from touch, useful objects like tool chests, metal furniture, a model step-ladder that cannot topple over, metal toys and other novelties.

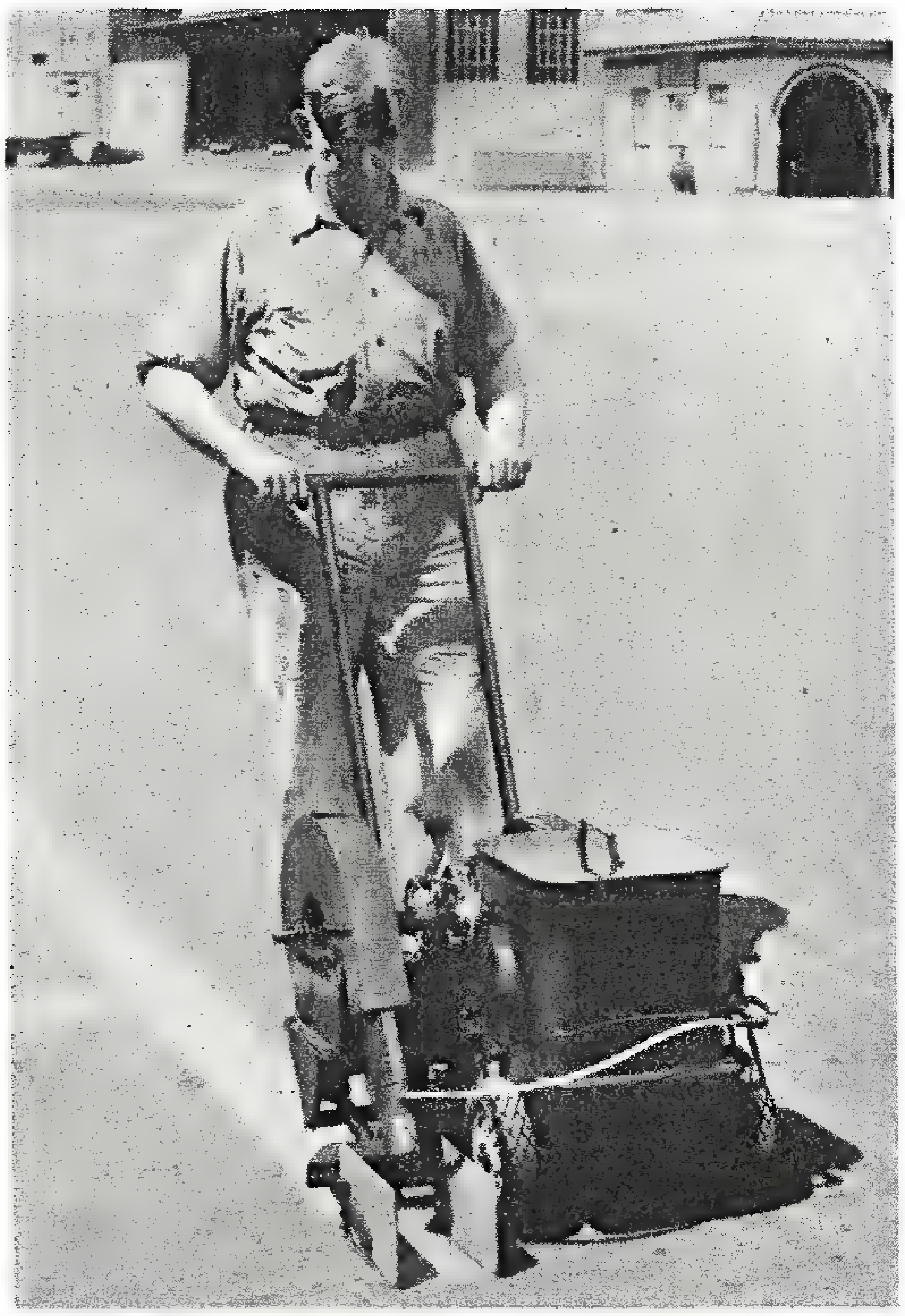
Carrier Fastens By Suction

A SPACIOUS, light-weight baggage carrier that fastens to the top of an auto by means of suction has been developed. Vacuum cups at each corner of the carrier are operated by suction transmitted to them by a small hose leading from the engine manifold.

To remove the carrier, it is only necessary to raise the edge of one of the rubber vacuum cups which eliminates the suction on the other three cups. As long as the suction is permitted to remain in the cups, the carrier will cling tenaciously to the car.

This automobile baggage carrier is instantly removable. It clings to the car top by means of rubber vacuum cups that are actuated by suction transmitted from the engine manifold.

Traffic Marker Sprays Paint



Powered by a $\frac{5}{8}$ horsepower gasoline engine, this traffic line marker is operated by one man. Paint from the nozzle is sprayed onto the pavement by means of a powerful fan.

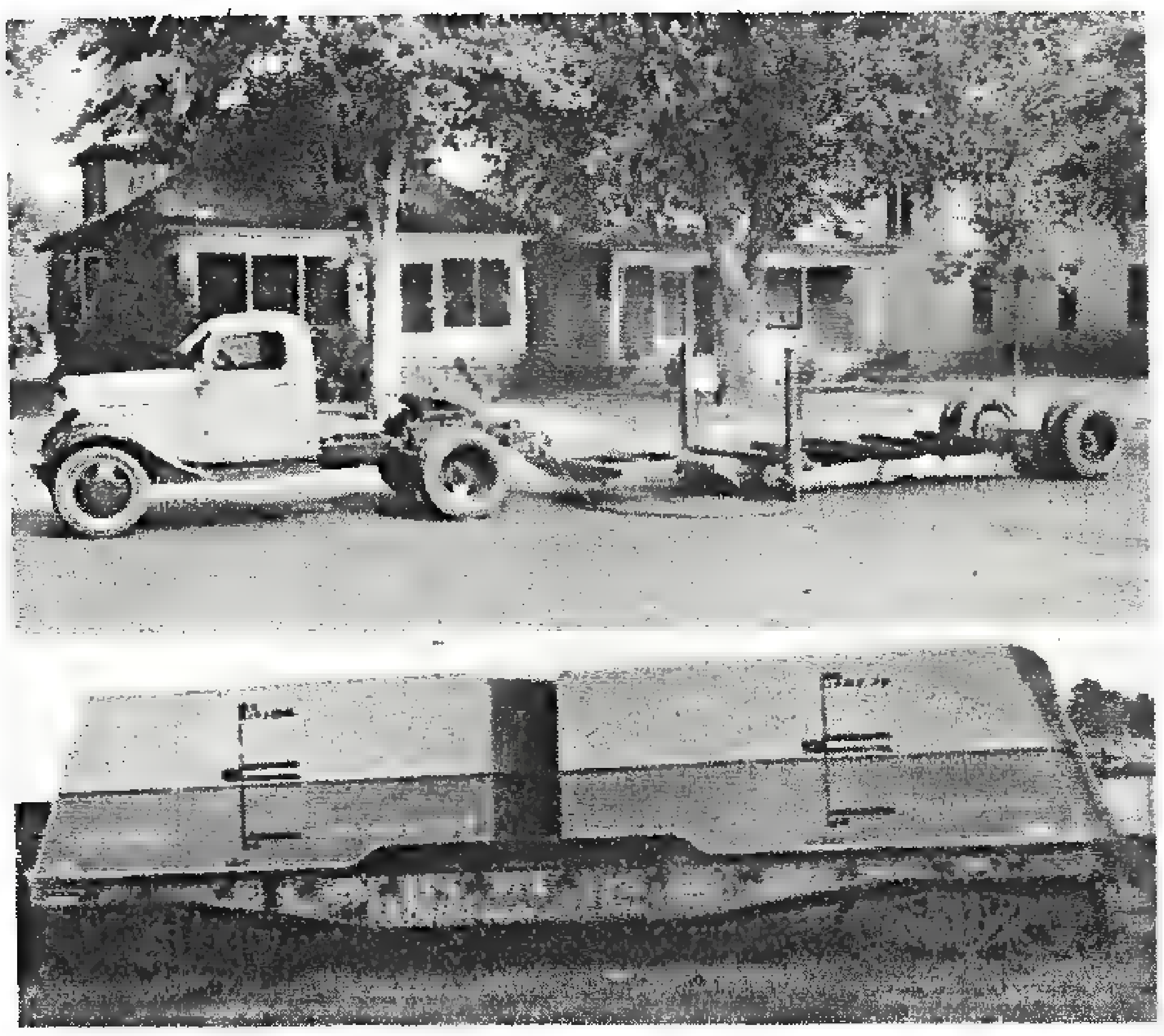
USING a new principle of operation, a traffic line marker developed by a Decatur, Ill., manufacturer, paints up to two miles of lines in a single hour. The new device uses a fan which atomizes the paint and sprays it down onto the pavement. The fan also blows dirt from worker's path.

Loading Device Aids Road-Rail Trailer Handling

SHIPPING interests featuring trailer-flat-car service have been aided by a loading device developed by a Minneapolis, Minn., inventor. The apparatus does away with the necessity for using special flat cars and equipment in order to anchor the trailers securely to the cars.

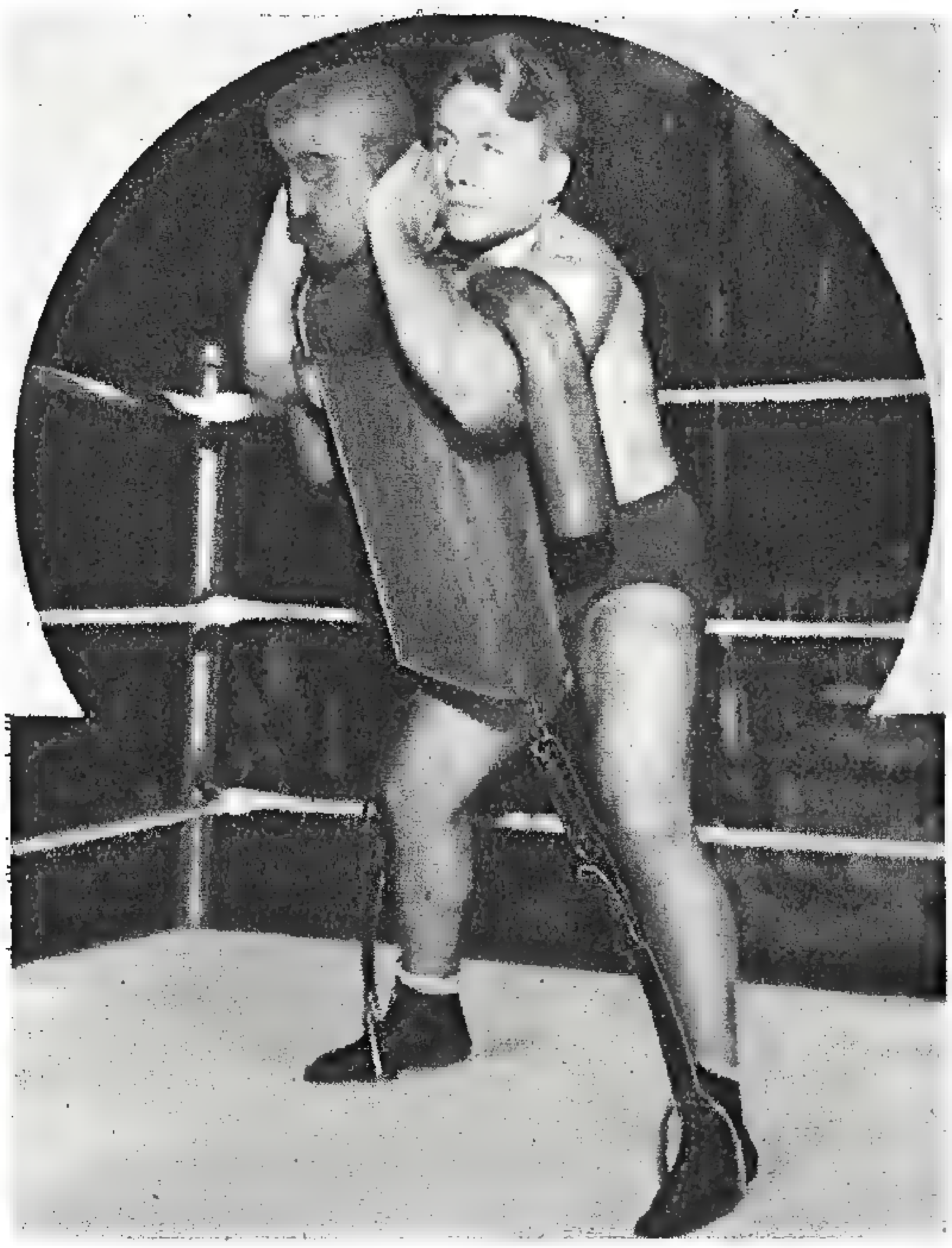
The loading device consists of a hydraulic mechanism, operated by a power takeoff from the motor of the truck pulling the trailer. With it, the trailer body can be lowered directly onto the floor of a flat car, taking the weight off the trailer tires and lowering the trailer's center of gravity which eliminates topheaviness in transit.

Two trailers can be loaded on one flat car. Unloaded, they require less yard storage space than a single freight car.



Top—This trailer chassis can be raised or lowered by compressed air device on truck. Bottom—Trailer bodies can be set flush on floor of railroad flatcar, eliminating topheaviness in transit, enabling locomotive to maintain speed along route.

Wrestler Spars With Dummy



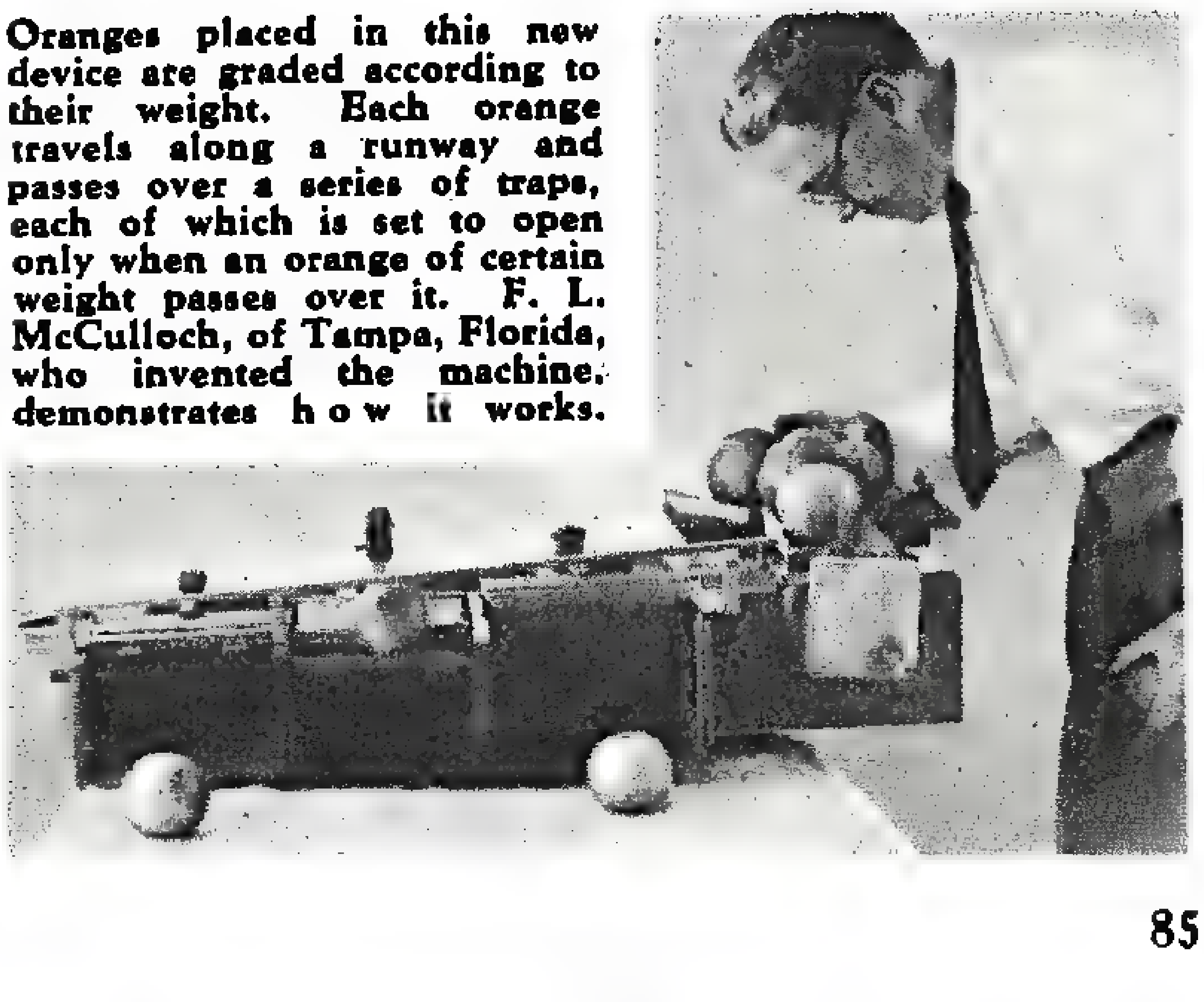
Fitted with strong metal springs and braces, this wooden sparring partner offers plenty of resistance to the powerful holds of Everett Marshall, a Detroit, Mich., heavyweight wrestler.

A WRESTLER in Detroit, Mich., prepares for bouts by practicing his holds on a wooden sparring partner. "Sandowstein," as the wooden dummy is called, is equipped with springs and braces that furnish resistant tension for the strong arms and legs of the wrestler, Everett Marshall.

Grades Oranges By Weight

GRADING oranges by weight instead of size is accomplished by a new machine invented by F. L. McCulloch, a mechanical research engineer of Tampa, Florida. Grading by weight is considered better than grading by size since an orange can be large but may have a pithy or frost bitten center.

The grader has a runway leading to three traps. Each trap is set by an adjustable weight which automatically springs the trap only when an orange of equal weight passes over the trap. Dropping through one of the traps, the oranges are deposited in bins at the side of the machine. Only one orange is graded at a time, a safety lock holding back the oranges until the one passing down the runway has been graded and deposited in its proper bin.



Oranges placed in this new device are graded according to their weight. Each orange travels along a runway and passes over a series of traps, each of which is set to open only when an orange of certain weight passes over it. F. L. McCulloch, of Tampa, Florida, who invented the machine, demonstrates how it works.

SPORTSMEN'S

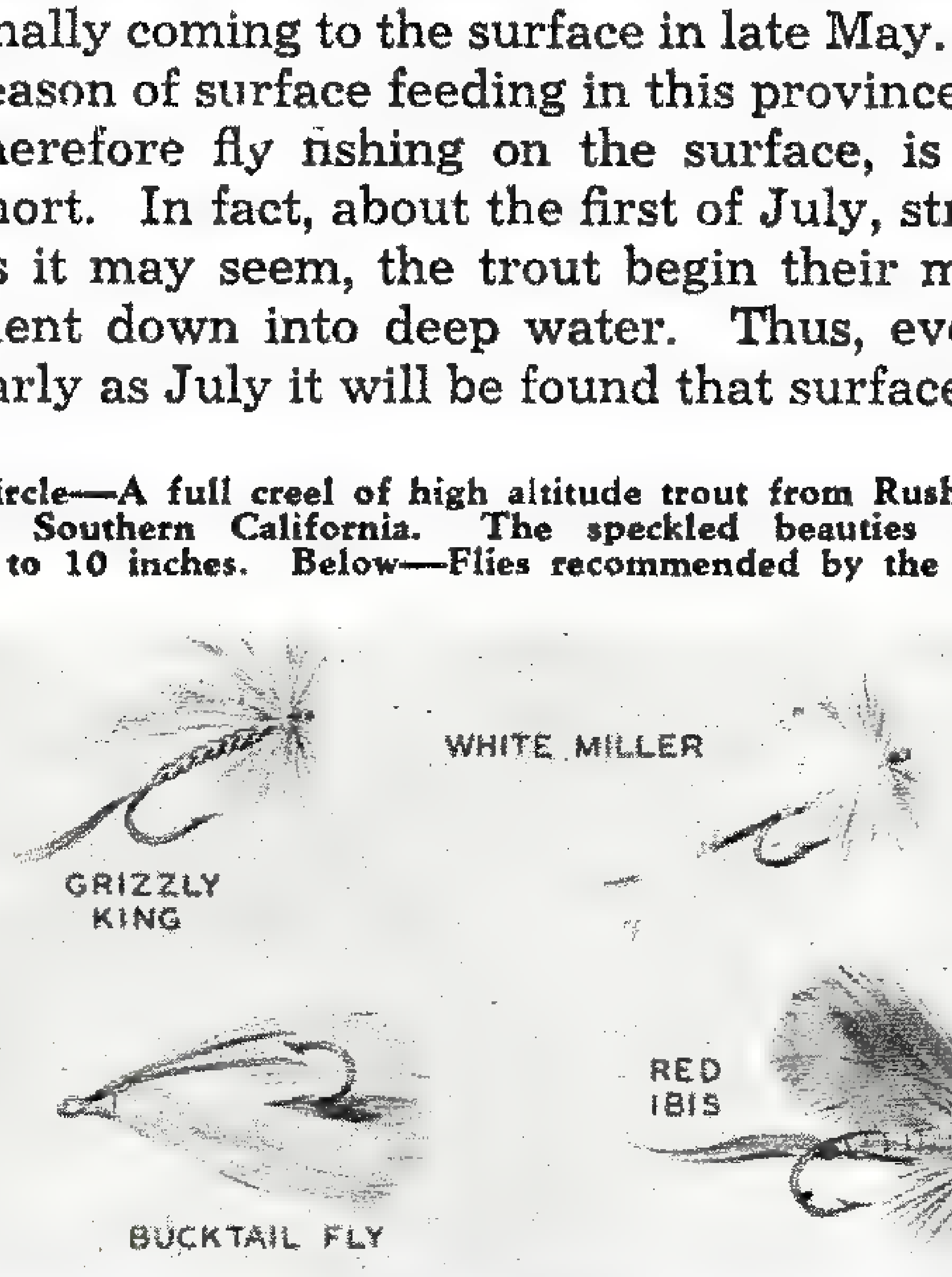
Fly Fishing From

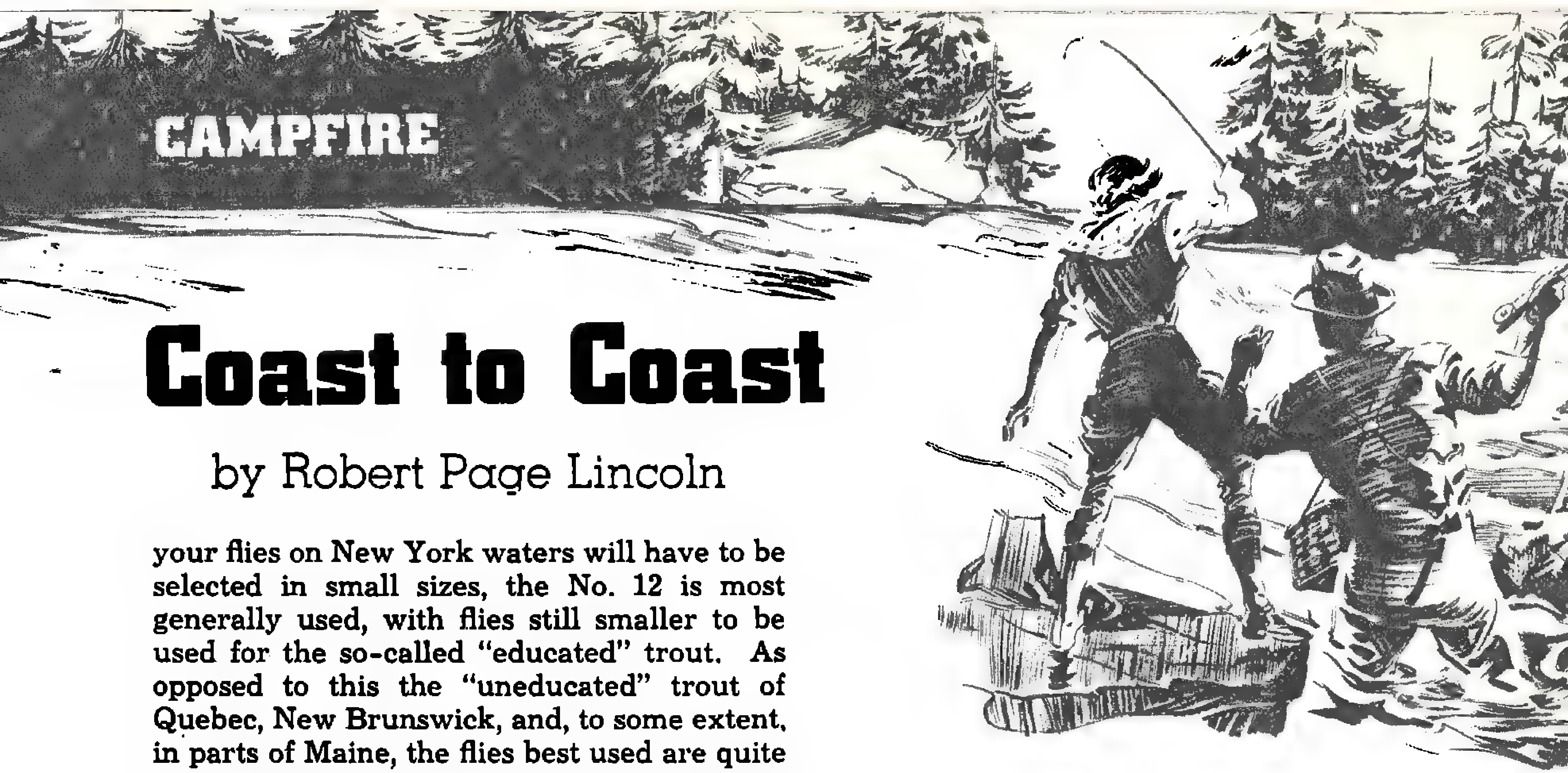
Knowing What Kind Of Flies To Use Is Just As Important As Having A Good Rod And Reel. In This Article, Robert Page Lincoln Tells You About Flies That Will Tempt The Finny Tribe.

WHILE to a certain extent there is a great similarity in the manner in which trout take the lures in various parts of the United States and Canada, it is a fact that different sections of the country require different tackle, and, to a certain extent, different lures. Big trout in Lake Edward of Quebec province and other streams and lakes of that region rarely are found on the surface feeding on flies until the 20th of May, with June the best possible month. Although the season on trout in Quebec opens on May first it is generally not until between the fifth and fifteenth of the month of May that the ice is out. Thereafter follows a space of time when the trout lie low, and close to the bottom, finally coming to the surface in late May. The season of surface feeding in this province, and therefore fly fishing on the surface, is very short. In fact, about the first of July, strange as it may seem, the trout begin their movement down into deep water. Thus, even as early as July it will be found that surface flies of the artificial variety will prove inadequate and it is only by trolling and the use of live bait, played deep, that one has any real sport and acquires the fish he is after. To a certain extent the same is true of New Brunswick streams, although there they are on the surface longer. Rangeley Lake and other famous streams and lakes in Maine are best fished at the first part of the season's opening, and again during the last part of the month of August. In fact it may be said that the best trout fishing in Maine is during the month of August.

It can be said with every degree of truth that the further north you go (as into Quebec province), the more untutored are the trout. In New York state, where the streams and lakes are extensively fished, small flies, and especially dry flies, are much used. Whereas

Circle—A full creel of high altitude trout from Rush Creek in Southern California. The speckled beauties average 8 to 10 inches. Below—Flies recommended by the author.





Coast to Coast

by Robert Page Lincoln

your flies on New York waters will have to be selected in small sizes, the No. 12 is most generally used, with flies still smaller to be used for the so-called "educated" trout. As opposed to this the "uneducated" trout of Quebec, New Brunswick, and, to some extent, in parts of Maine, the flies best used are quite large. In fact, those tied to Nos. 3 and 5 hooks are recommended. Favorite Quebec and New Brunswick flies in the wet fly class are the Professor, Queen of the Waters, Grizzly King, Gray and Green Drakes, Montreal, Silver Doctor, Coachman, the various Hackles and the Scarlet Ibis. Northern trout (Canadian trout) seem to like the bright colored flies, whereas these same flies in New York and other waters deeper down, are likely to be given comparatively little attention.

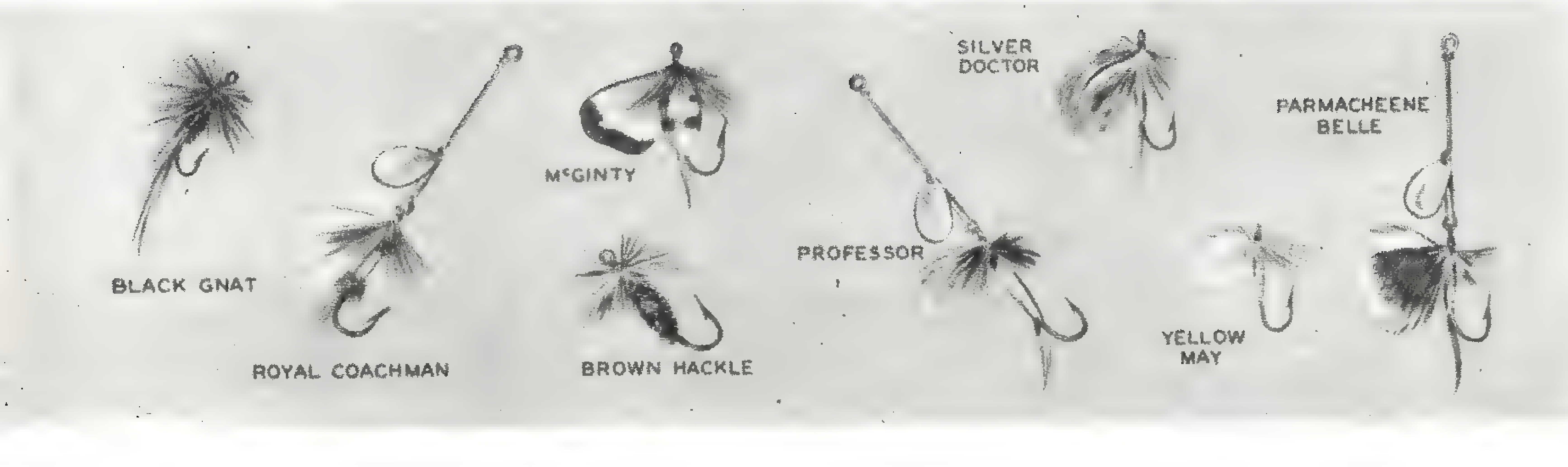
The five best true and tried wet fly patterns for use in the streams and ponds of Maine are the Montreal, the Silver Doctor, the Parmachene Belle, Brown Hackle and Grizzly King. Best flies for New York are the Coachman, Brown Hackle, Professor, Green Drake and Grizzly King.

The trout waters that flow eastward into the Atlantic in the Allenghany region, taking in Maryland, Virginia, Pennsylvania and New York up to Lake Ontario, afford their best trout fishing from around early April to the end of June. The fishing in these sections has a far earlier start than in any other section of the country, being in the eastern temperate zone. Bait fishing is followed up in these sections during April, while fly fishing starts in May.

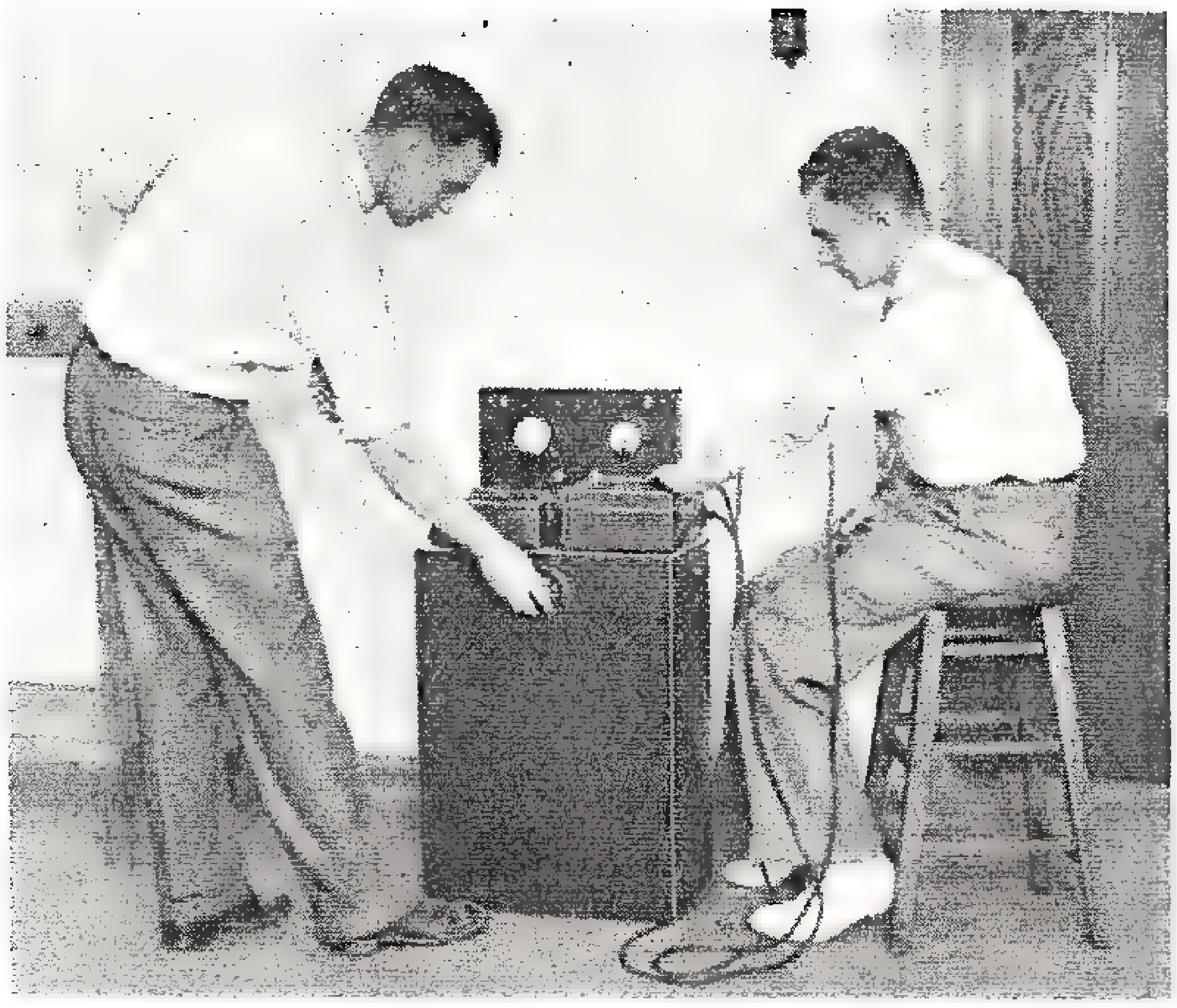
In some of the mountain lakes, ponds and streams in this section it will be found that various minnow lures, showing a silvery belly, are especially good. This is especially true in the Adirondacks in some sections of which trout practically refuse all manner of flies, but are taken on these imitation minnows. The chief dry fly fishing streams in the eastern part of the country are found in the state of New York, principally in Sullivan, Orange and Delaware counties of that state. Unexcelled New York dry flies are the Brown Bi-visible, the Fanwing Royal Coachman, Cahill Light, Hendrickson Dark, Wickham's Fancy and the Yellow May. For the whole eastern part of the United States, in trout territory, it is possible that the Brown Bi-visible would lay just claim to being the best all-around dry fly, added to which it might also be stated that the Brown Hackle and the Light Cahill are the two best all-around wet flies.

Pike and Wayne counties in Pennsylvania are choice trout fishing sections that are an-

[*Continued on page* 120]



Diathermy Machine Regulates Heat Treatments



Dr. Allan Hemingway, of the University of Minnesota, demonstrates his new diathermy machine. Through its use, heat in controlled amounts can be applied to any part of the body.

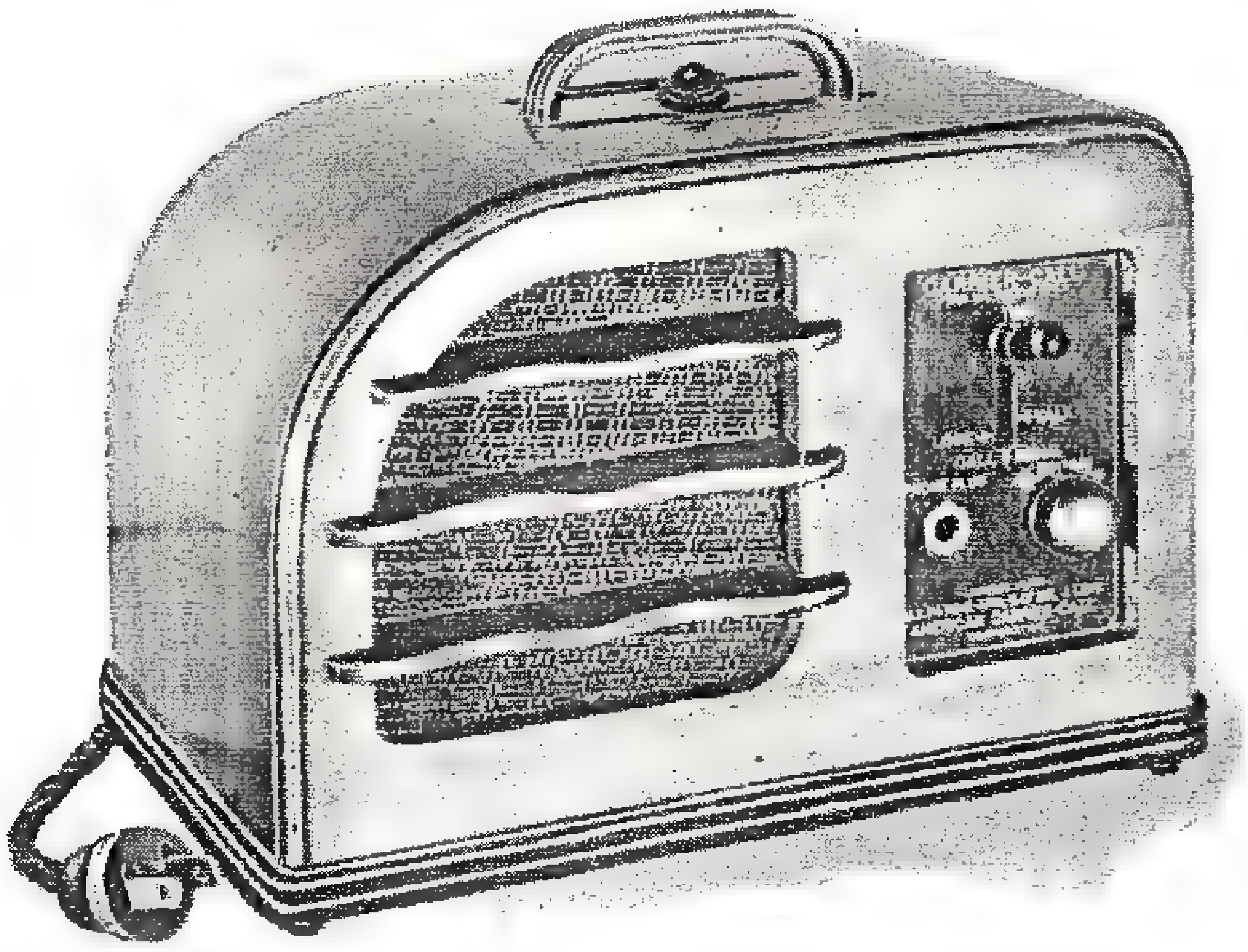
AUTOMATICALLY measured and controlled amounts of heat can be given to patients through the use of a high frequency diathermy machine developed by Dr. Allan Hemingway at the University of Minnesota in Minneapolis. Heat production can be regulated to any amount from 20 to 200 watts and is measured by high frequency meters.

The machine changes high voltage 60-cycle current from an outer circuit into the one million-cycle circuit used to treat patients. The heat is localized, without discomfort, to any spot on the patient's body by means of small metallic pads used as electrodes.

Phone Uses Light Sockets

A NOVEL telephone which a person can plug into the nearest electric light socket to talk with another person plugging a similar telephone into a similar outlet near at hand has been developed by a New York City manufacturer. It was demonstrated at the New York Museum of Science and Industry by Dr. O. H. Caldwell, a trustee of the museum.

Communication between the two phones is accomplished over the electric light wires themselves, with no other wires than the usual cords to the attachment plugs. The phones can be moved and are so sensitive that talk in an ordinary tone of voice at five or ten feet distance can readily be heard.

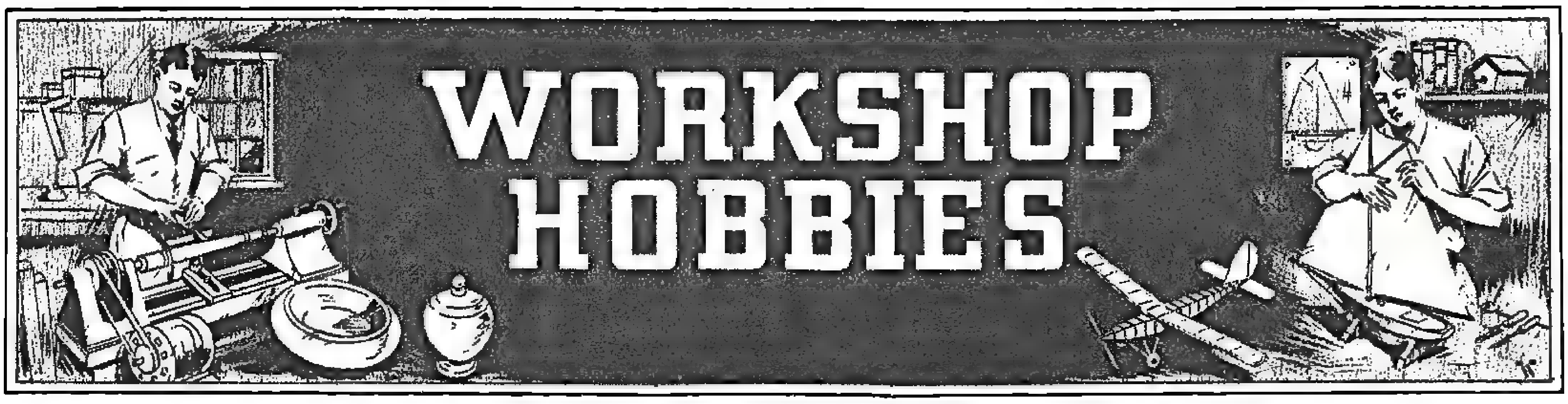


Plug this new telephone device into the nearest electric light socket and you can converse with persons in other parts of the building who have similar telephones plugged to sockets.

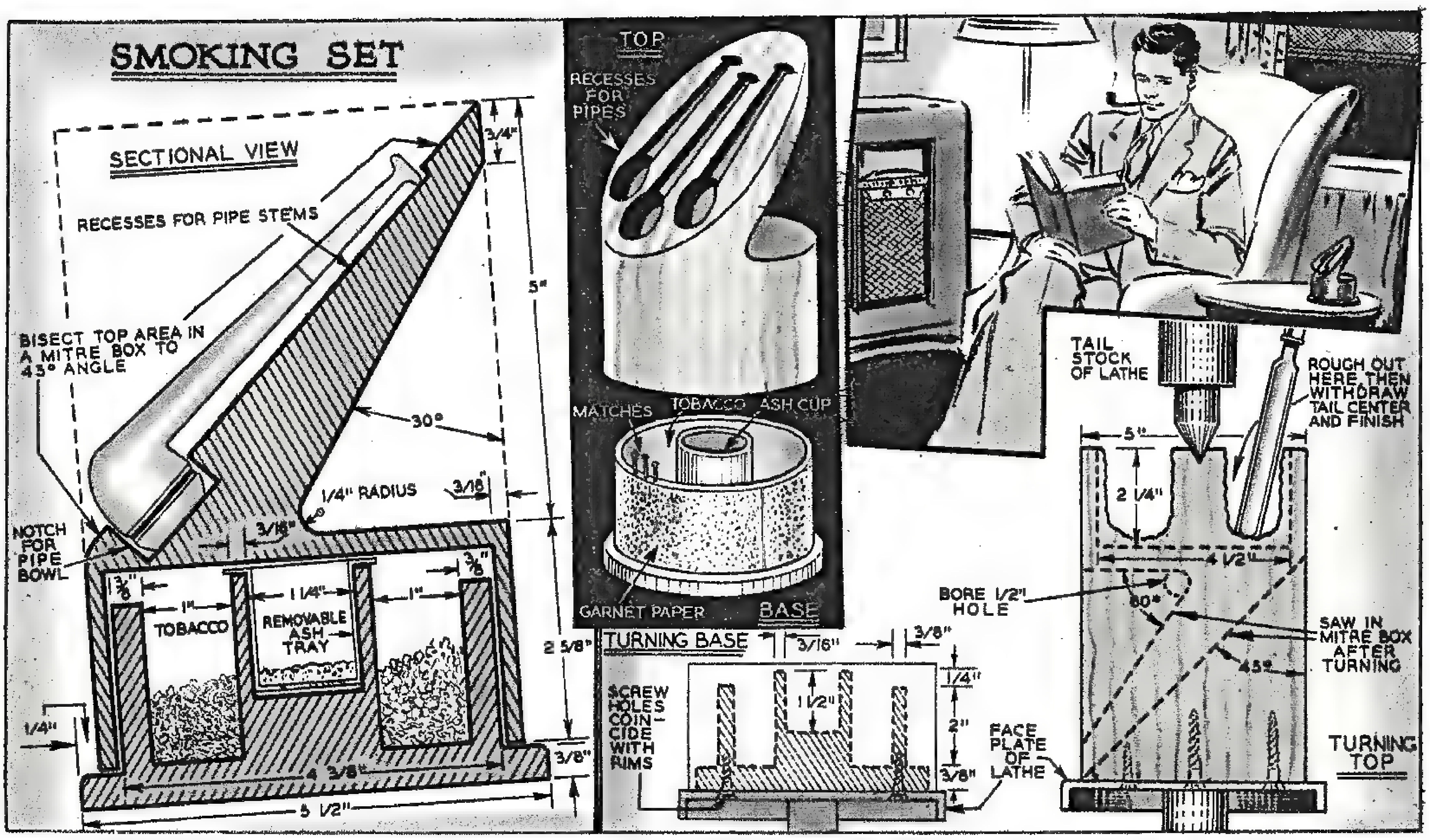
Grass Cutter Aids Golfers

This new grass cutter has a steel golf club shaft. It has a "whip" action like a real golf club and enables golfers to practice swings and putts while weeding and cutting the lawn.

GOLFERS can retain their swinging and putting form while cutting the grass lawns of their homes through the development of a grass cutting tool that looks and swings like a golf club. The tool's 8-inch blade shears grass close to ground.


WORKSHOP
HOBBIES

SMOKING SET TURNED FROM COLORED WOODS


SMOKING SET
SECTIONAL VIEW
RECESSES FOR PIPE STEMS
BISECT TOP AREA IN A MITRE BOX TO 45° ANGLE
NOTCH FOR PIPE BOWL
3/4"
5"
30°
1/4" RADIUS
3/16"
3/16"
3/8"
3/8"
1"
1 1/4"
1"
TOBACCO
REMOVABLE ASH TRAY
2 5/8"
1/4"
3/8"
4 3/8"
5 1/2"
TOP
RECESSES FOR PIPES
MATCHES
TOBACCO
ASH CUP
GARNET PAPER
BASE
TURNING BASE
3/16"
3/8"
1/4"
1 1/2"
2"
3/8"
SCREW HOLES COINCIDE WITH RIMS
FACE PLATE OF LATHE
TAIL STOCK OF LATHE
ROUGH OUT HERE THEN WITHDRAW TAIL CENTER AND FINISH
5"
2 1/4"
4 1/2"
BORE 1/2" HOLE
60°
SAW IN MITRE BOX AFTER TURNING
45°
TURNING TOP

Not only is this Smoking Set an attractive home workshop project but a useful article for the den as well. Several different kinds of contrasting hardwoods glued up into a block will provide a unique turned lathe article. The tobacco compartment holds a full can of smoking mixture. The top of the Smoking Set serves as a pipe rack. Three pipes conveniently fit into lid.

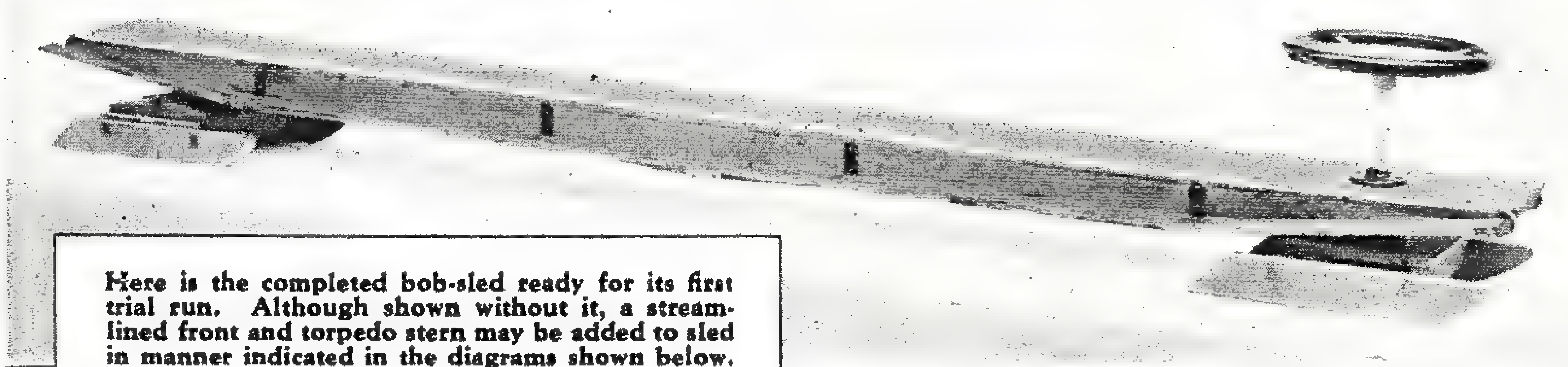
BY THE use of several different kinds of hardwoods of contrasting tones glued up in a block and turned on a lathe a really handsome as well as very useful smoking set can be made by following the accompanying drawings. Such hardwoods as walnut, oak, maple or mahogany will be satisfactory.

If your lathe will swing six inches this job should be easy. A sectional view is shown in the above illustrations. Note that the top containing the pipe rack fits over the base, concealing humidor, ash cup and matches. It has a capacity of one can of tobacco.

Turning the base is a comparative simple lathe job, with the block securely screwed to the face plate. The screw holes should coincide with the rim of the tobacco compartment. The top will present a more difficult lathe job. The block should be screwed to the face plate and the heaviest cuts taken with the tail-center in use. When as much roughing is done as possible in this arrangement, back off the tail-center and finish with light cuts, while it is still on the face plate.

When the lathe work is completed, bore a hole as indicated and cut the pipe rack in a mitre box. Bore recesses for pipe bowls and finish the bottoms of them with a routing tool. The grooves for the pipe stems will have to be done with a round-nosed carving tool, and finished with garnet paper and steel wool. By alternate applications of shellac and polishing with steel wool or pumice stone a high gloss will be achieved. The completed set is a useful accessory for the den or home study room.

A BOB-SLED FOR WINTER



Here is the completed bob-sled ready for its first trial run. Although shown without it, a streamlined front and torpedo stern may be added to sled in manner indicated in the diagrams shown below.

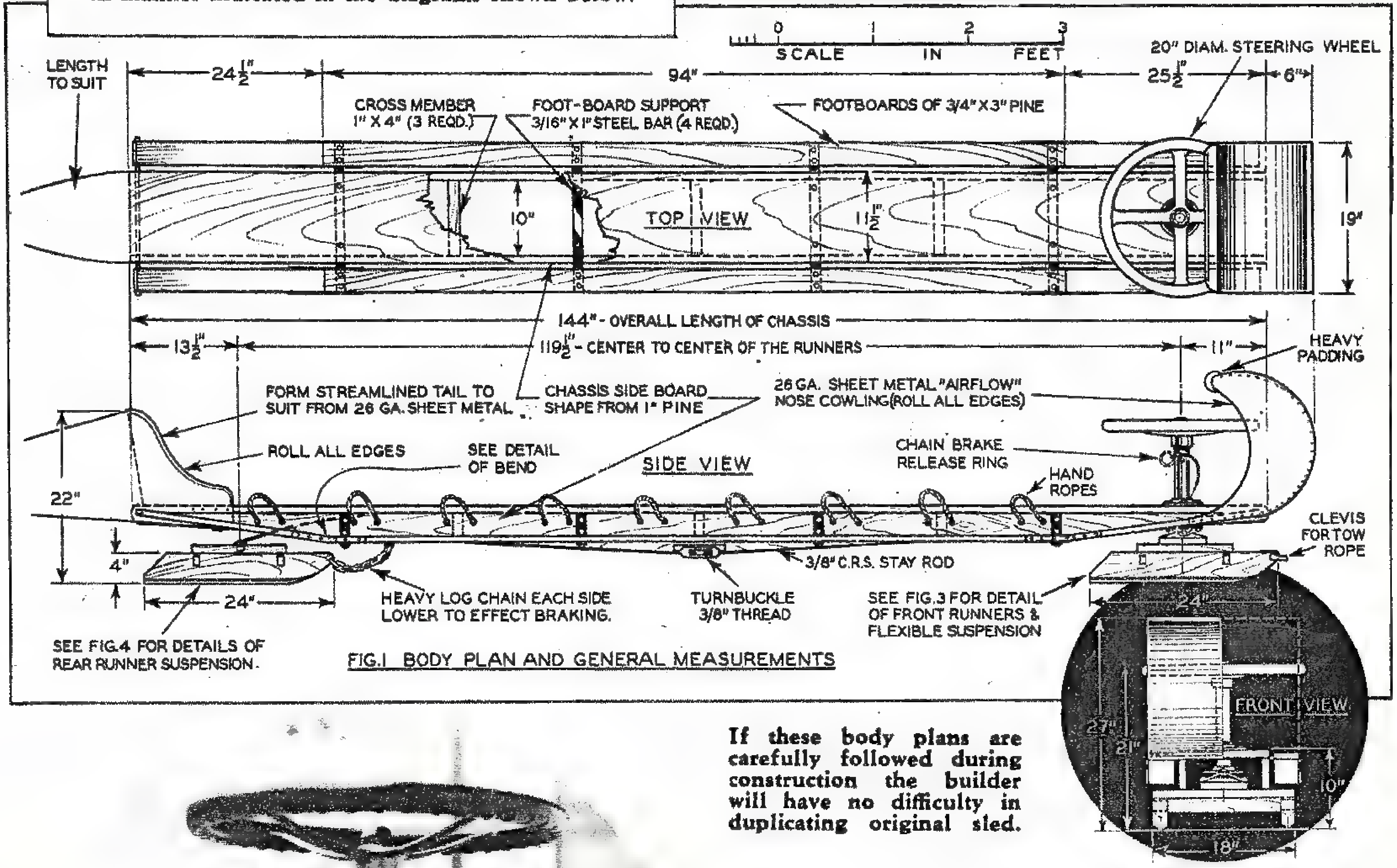
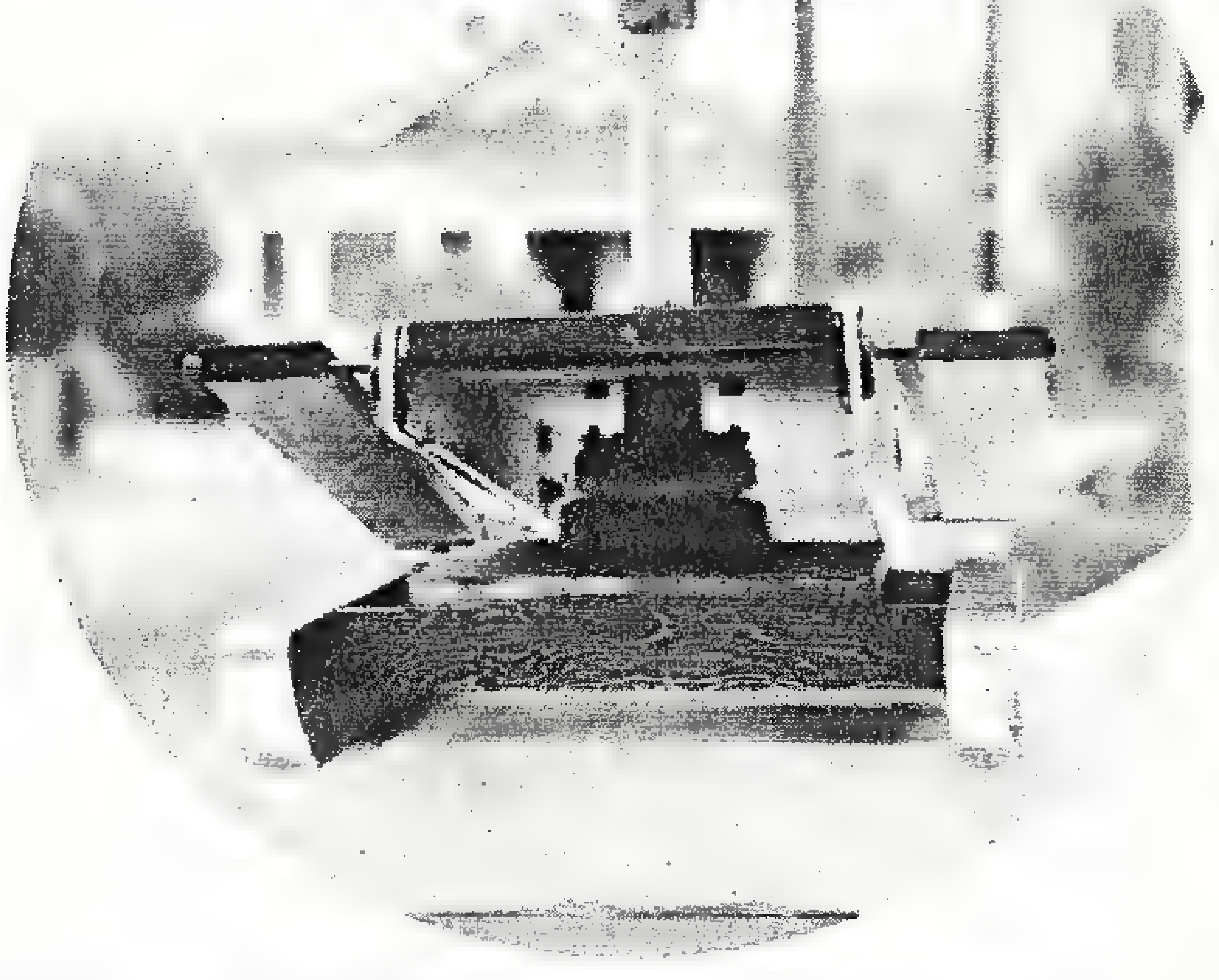

SCALE IN FEET
0
1
2
3
LENGTH TO SUIT
24½"
94"
25½"
6"
20" DIAM. STEERING WHEEL
CROSS MEMBER 1" X 4" (3 REQD.)
FOOT-BOARD SUPPORT 3/16" X 1" STEEL BAR (4 REQD.)
FOOTBOARDS OF 3/4" X 3" PINE
10"
TOP VIEW
11½"
19"
144" - OVERALL LENGTH OF CHASSIS
13½"
119½" - CENTER TO CENTER OF THE RUNNERS
11"
HEAVY PADDING
FORM STREAMLINED TAIL TO SUIT FROM 26 GA. SHEET METAL
CHASSIS SIDE BOARD SHAPE FROM 1" PINE
26 GA. SHEET METAL "AIRFLOW" NOSE COWLING (ROLL ALL EDGES)
ROLL ALL EDGES
SEE DETAIL OF BEND
SIDE VIEW
CHAIN BRAKE RELEASE RING
HAND ROPES
22"
4"
24"
CLEVIS FOR TOW ROPE
3/8" C.R.S. STAY ROD
HEAVY LOG CHAIN EACH SIDE LOWER TO EFFECT BRAKING.
TURNBUCKLE 3/8" THREAD
SEE FIG.3 FOR DETAIL OF FRONT RUNNERS & FLEXIBLE SUSPENSION
SEE FIG.4 FOR DETAILS OF REAR RUNNER SUSPENSION.
24"
FRONT VIEW
27"
21"
10"
18"

FIG.1 BODY PLAN AND GENERAL MEASUREMENTS

If these body plans are carefully followed during construction the builder will have no difficulty in duplicating original sled.



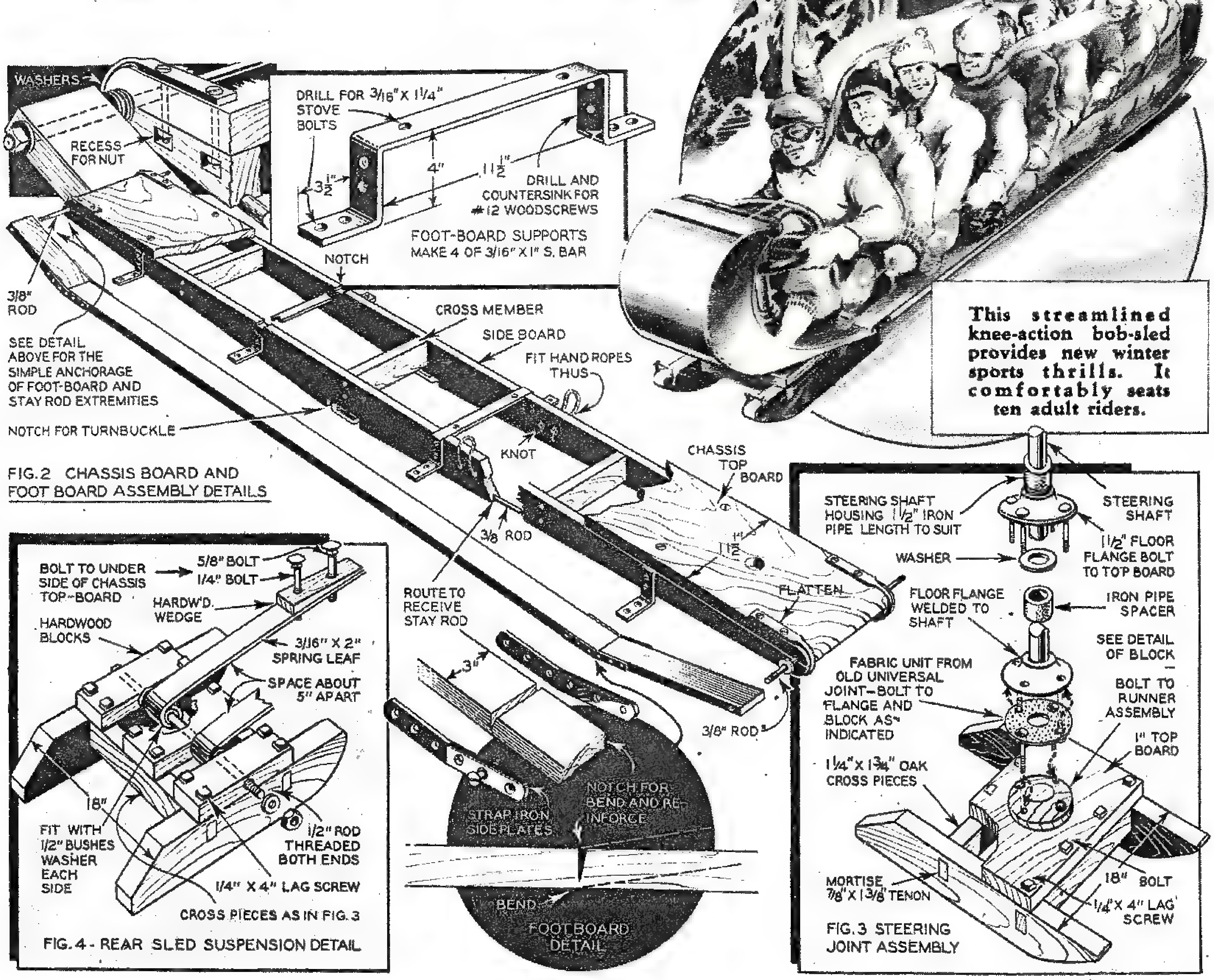
This front-end view shows the steering gear assembly. The steering shaft is held rigidly erect by a length of 1½-inch pipe and a floor flange mounted on top of chassis board. Steering wheel connects to front runners through universal joint disc.

by Dick Cole

HERE is a bob-sled which will please the fancy of any winter sport enthusiast. It combines all the desirable features demanded in a bob-sled: light weight, strength, comfort, safety, ease of control and *Class*.

Figure 1 shows the general detail which will orient the prospective builder with the special features, general assembly and salient dimensions. At first glance one is impressed with its speedy appearance. Now look at the front runner assembly, and note that it is connected to the steering shaft with a universal joint. This is shown in assembly form in Figure 3. The joint is of the fabric disc type, prevalent on many cars several years ago. It permits the front runners to pitch and

SPORTS THRILLS


WASHERS
RECESS FOR NUT
DRILL FOR 3/16" X 1 1/4" STOVE BOLTS
3 1/2"
4"
11 1/2"
DRILL AND COUNTERSINK FOR #12 WOODSCREWS
FOOT-BOARD SUPPORTS MAKE 4 OF 3/16" X 1" S. BAR
NOTCH
3/8" ROD
SEE DETAIL ABOVE FOR THE SIMPLE ANCHORAGE OF FOOT-BOARD AND STAY ROD EXTREMITIES
CROSS MEMBER
SIDE BOARD
FIT HAND ROPES THUS
NOTCH FOR TURNBUCKLE
KNOT
CHASSIS TOP BOARD
FIG. 2 CHASSIS BOARD AND FOOT BOARD ASSEMBLY DETAILS
3/8 ROD
1"
11 1/2"
FLATTEN
ROUTE TO RECEIVE STAY ROD
3"
3/8" ROD
STRAP IRON SIDE PLATES
NOTCH FOR BEND AND RE-INFORCE
BEND
FOOT BOARD DETAIL
BOLT TO UNDER SIDE OF CHASSIS TOP-BOARD
5/8" BOLT
1/4" BOLT
HARDW'D. WEDGE
HARDWOOD BLOCKS
3/16" X 2" SPRING LEAF
SPACE ABOUT 5" APART
18"
FIT WITH 1/2" BUSHES WASHER EACH SIDE
1/2" ROD THREADED BOTH ENDS
1/4" X 4" LAG SCREW
CROSS PIECES AS IN FIG. 3
FIG. 4 - REAR SLED SUSPENSION DETAIL
STEERING SHAFT HOUSING 1 1/2" IRON PIPE LENGTH TO SUIT
STEERING SHAFT
1 1/2" FLOOR FLANGE BOLT TO TOP BOARD
WASHER
FLOOR FLANGE WELDED TO SHAFT
IRON PIPE SPACER
SEE DETAIL OF BLOCK
FABRIC UNIT FROM OLD UNIVERSAL JOINT—BOLT TO FLANGE AND BLOCK AS INDICATED
BOLT TO RUNNER ASSEMBLY
1" TOP BOARD
1 1/4" X 1 3/4" OAK CROSS PIECES
MORTISE 7/8" X 1 3/8" TENON
18" BOLT
1/4" X 4" LAG SCREW
FIG. 3 STEERING JOINT ASSEMBLY

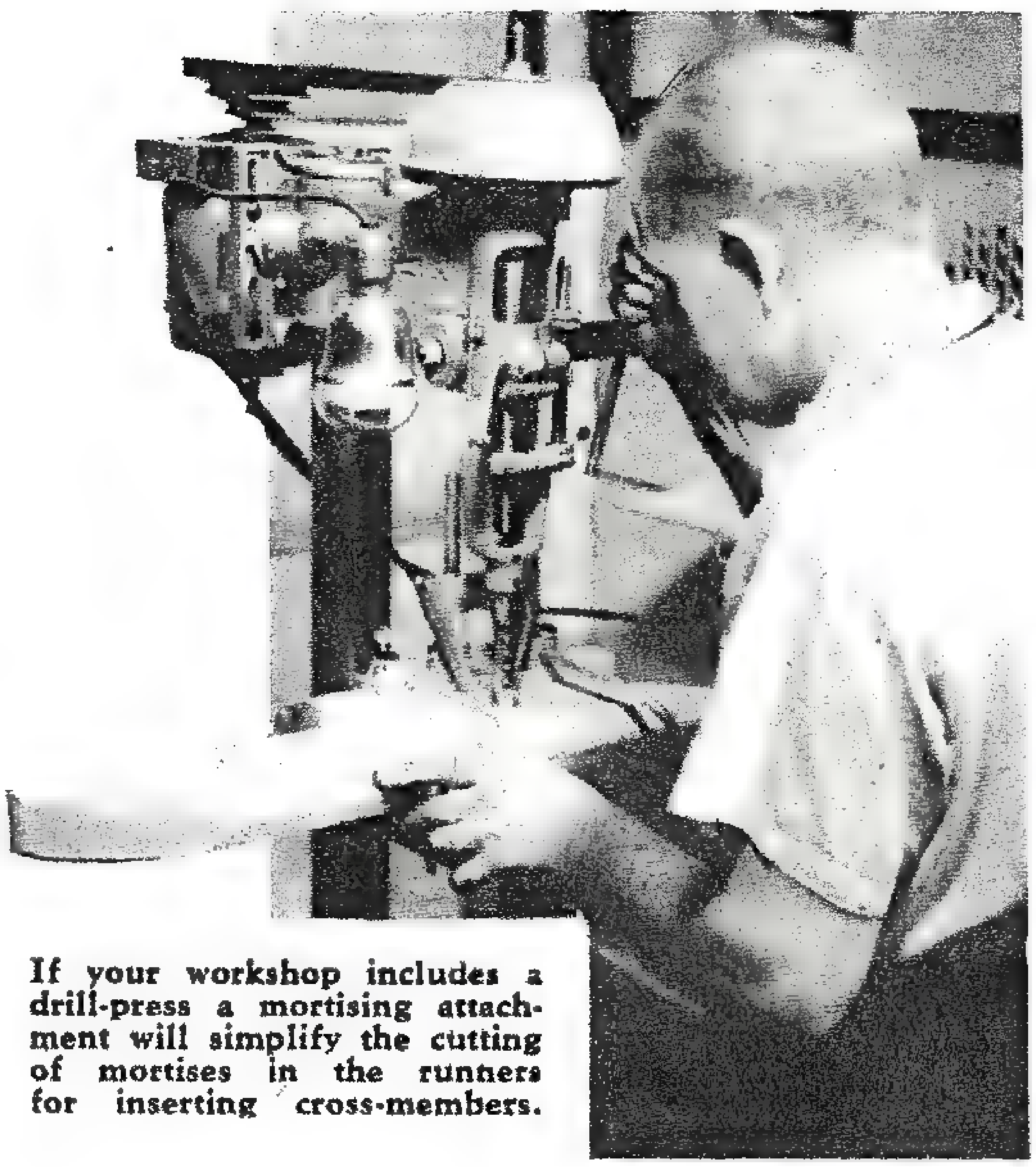
This streamlined knee-action bob-sled provides new winter sports thrills. It comfortably seats ten adult riders.

The universal steering assembly is clearly shown above. A fabric unit from a wrecked car universal joint provides the knee-action.

to rock through an angle of about fifteen degrees without the slightest lost motion, or lash, in the steering shaft itself. The parts needed for this can be picked up at any auto wrecking yard for a few cents.

Now for the back runner assembly. Note that it is connected to the chassis board with spring leaves, which contribute flexibility to the bob-sled. The "flexible" feature adds to the safety, as well as to the comfort, of the riders. If a bob-sled is too rigid it is likely to be upset if the runners on one side hit a hummock of ice. This bob-sled rides the hummocks like a knee-action car.

It might be well to explain the reason for the turnbuckles underneath the middle of the bob-sled. These provide adjustment to two 3/8" stay-rods which pass completely under the chassis and contribute great strength and rigidity to the structure. Their use permits the use of a light weight chassis board, only 7/8" thick, instead of the use of a heavy, non-reinforced plank. The construction of the



If your workshop includes a drill-press a mortising attachment will simplify the cutting of mortises in the runners for inserting cross-members.

chassis board and foot board assembly is taken up in Figure 2.

The drawings are so explicit that little elaboration is necessary. All the wood used can be No. 1 pine, spruce, ash, or the like. It might be well to call attention to the method employed to anchor the ends of the stay-rods securely. Wood screws alone would not do the trick, but the use of 1/4" stove-bolts, as shown in the detailed drawing in Figure 2, will supply a solid anchorage. The recesses containing the nuts can later be filled with plastic wood.

After the chassis board assembly is complete, the edges of the board should be rounded off, all wood should be sanded smooth and be treated with several coats of good spar varnish. Beware of wood splinters on a bob-sled.

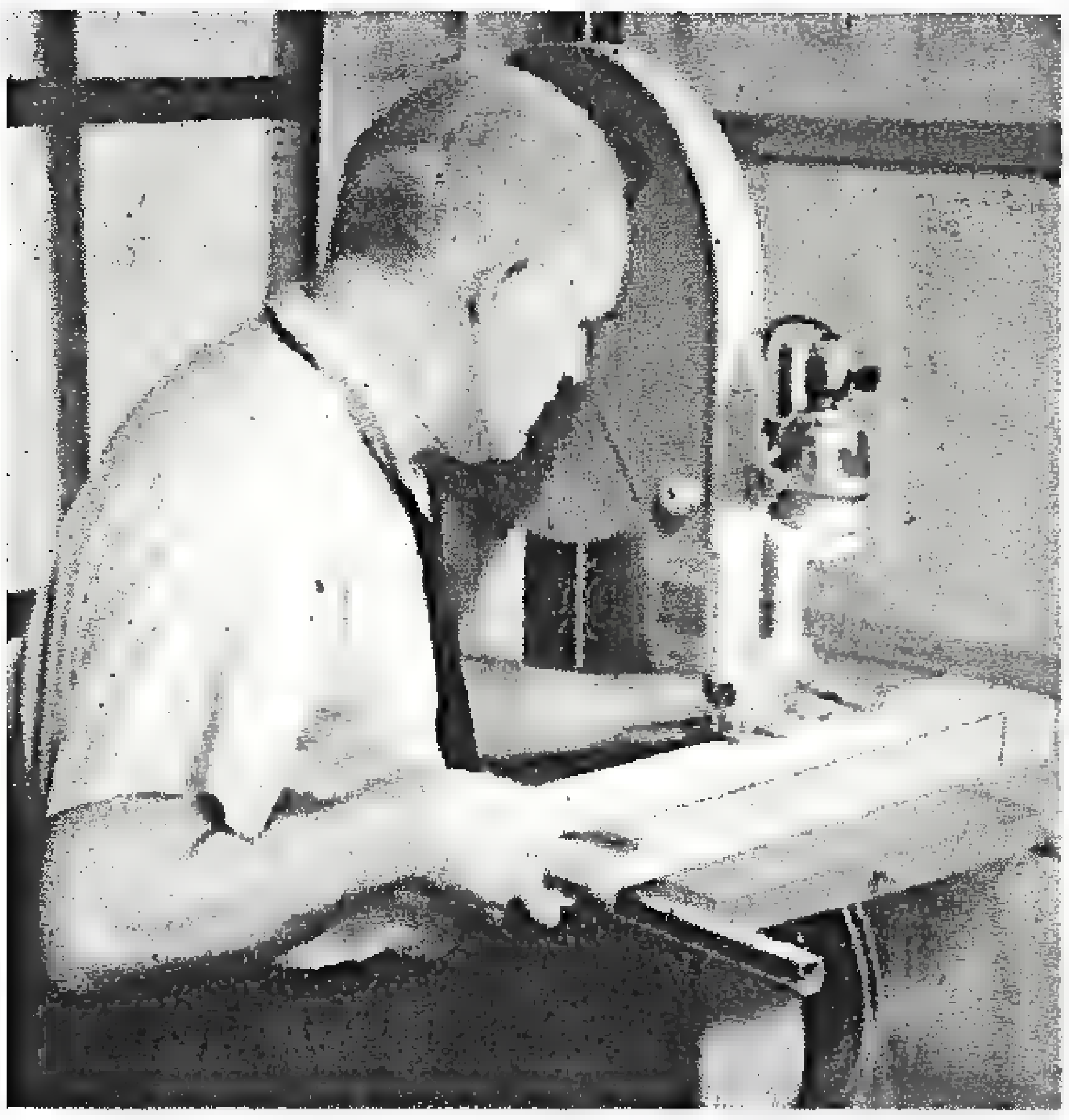
Figure 3 discloses the details of the front runner assembly. It will be seen that a visit must be made to an auto wrecking yard and to a hardware store. The wrecking yard will contribute the universal joint disc and the old steering wheel. Get a big wheel, a 20" one, if possible. If you cannot obtain a large universal disc in good condition at the wrecking yard, a new one can be bought at any auto parts store for less than a dollar. A hardware store must supply the floor flanges, short lengths of pipe and the 1/8"x2" cold-rolled steel for the runners.

The woodwork of the sleds is simple. The runners are band-sawed from 1¾" clear pine, oak or maple. With the jointer fence set at 30 degrees, the V edge is cut on the bottom of the runners. The V continues up the curved front for about 1½". The 1/8"x2" cold-rolled steel bar is now fitted to the surface. The V can be shaped cold by hammering the steel over the edge of a length of angle iron. After the approximate shape has been reached, the wood screws will pull it to a snug fit. Any slight elevations can be brushed down with a mill file and the whole be polished brightly with emery cloth. Figures 6 and 7 show the runner details.

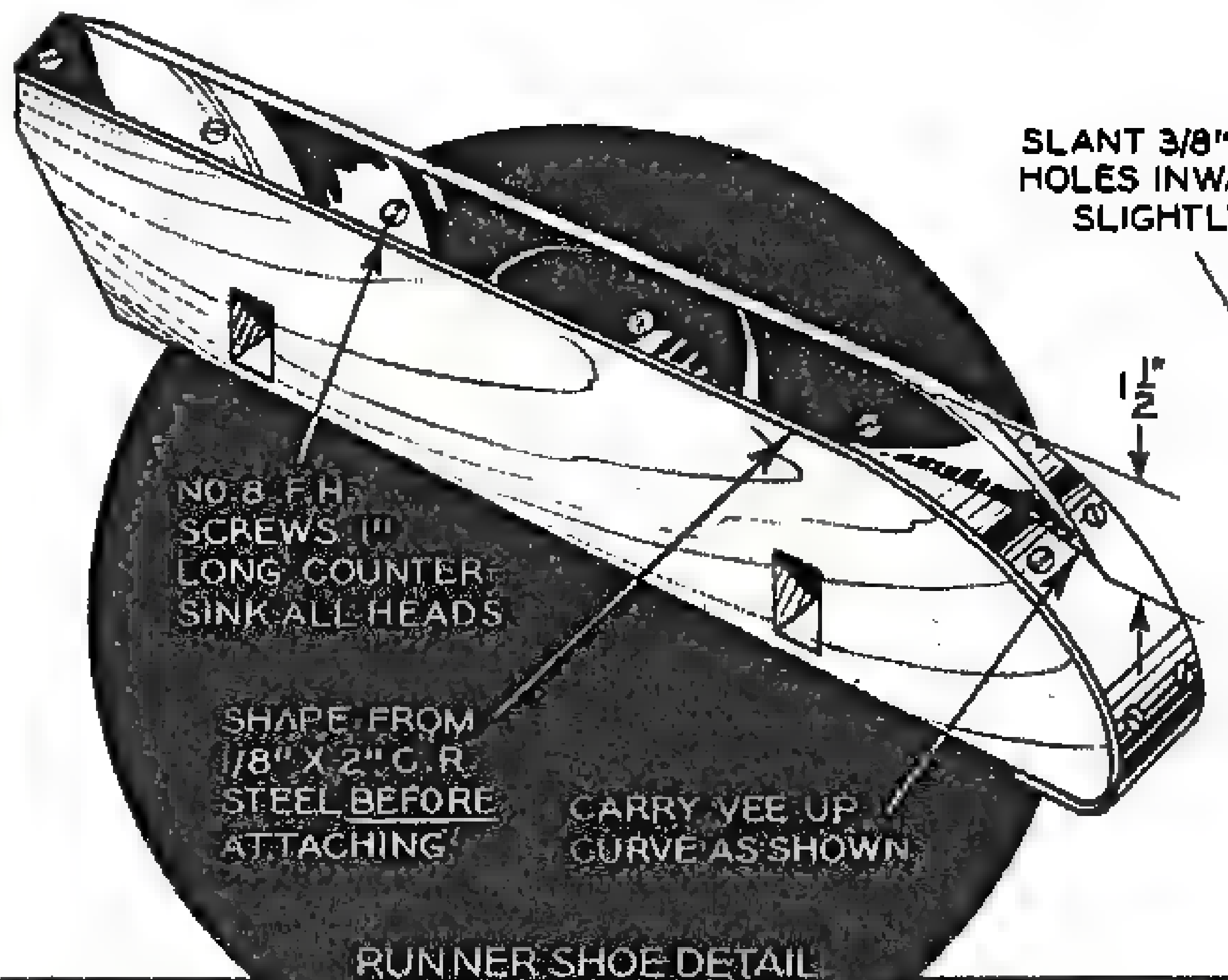
It will be seen that the cross-members of the sled are mortised into the runners. Nearly every homework fan has mortising facilities, so this job will not be laborious. The mortised assembly is topped with a 1" board, and with the use of 1/4" lag screws and bolts the runners are made into a rigid unit assembly. Note that the lag screws pass through the tenon of the joint. Their length prevents the runners from splitting.

The fitting of the universal joint is shown in Figures 3 and 5. The first operation is to turn up the universal block shown in Figure 5. This is mounted permanently in the center of the top board of the sled. Four bolts hold it in place, but two of the holes also pass through two diametrically opposed holes of

[*Continued on page* 124]



The runners are cut out on a band saw from maple, oak or No. 1 pine. The sawing operation is shown in the above photo. The plan shown at right gives the necessary runner dimensions. Runner shoes are cut from 1/8" by 2" C. R. steel.


NO. 8 F.H. SCREWS 1" LONG COUNTER-SINK ALL HEADS
SHAPE FROM 1/8" X 2" C.R. STEEL BEFORE ATTACHING
CARRY VEE UP CURVE AS SHOWN
1½"

RUNNER SHOE DETAIL
— FIG 7 —

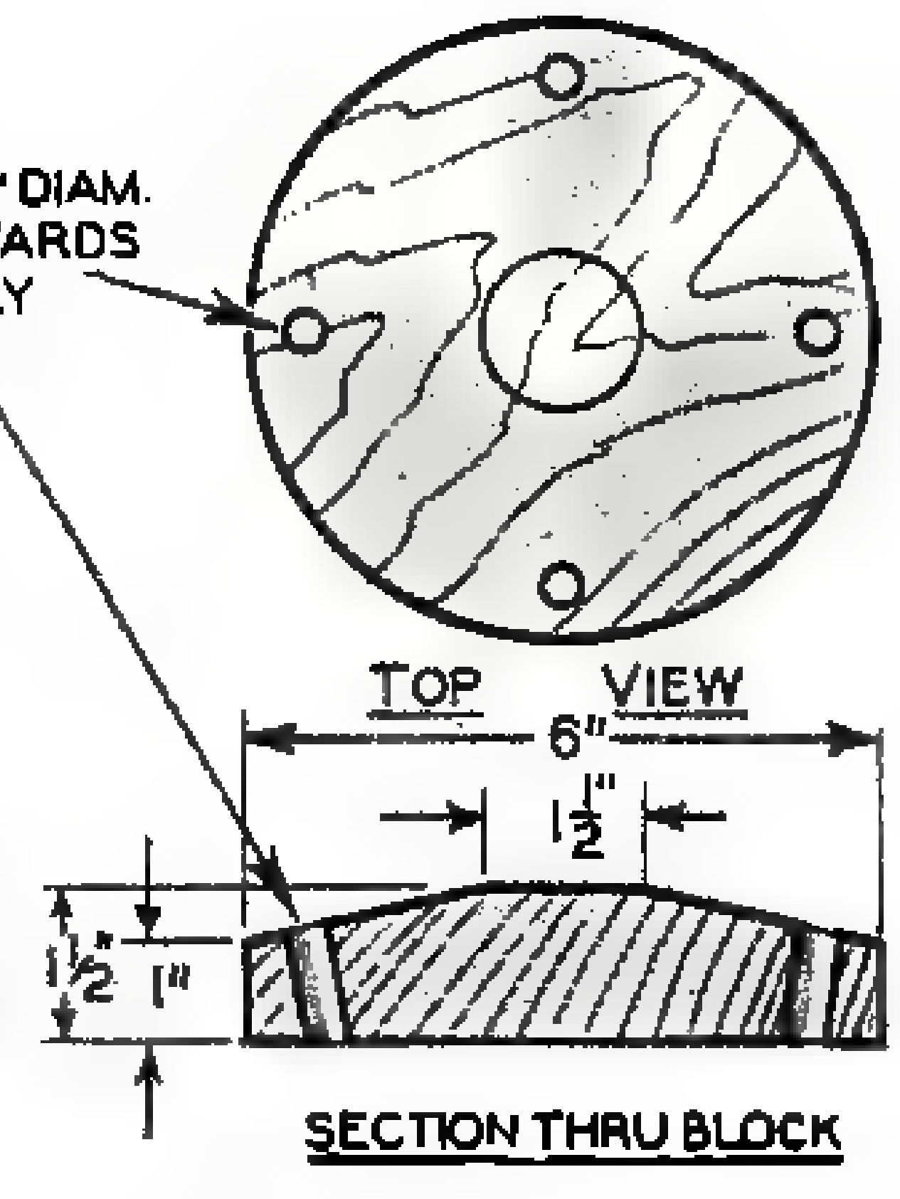
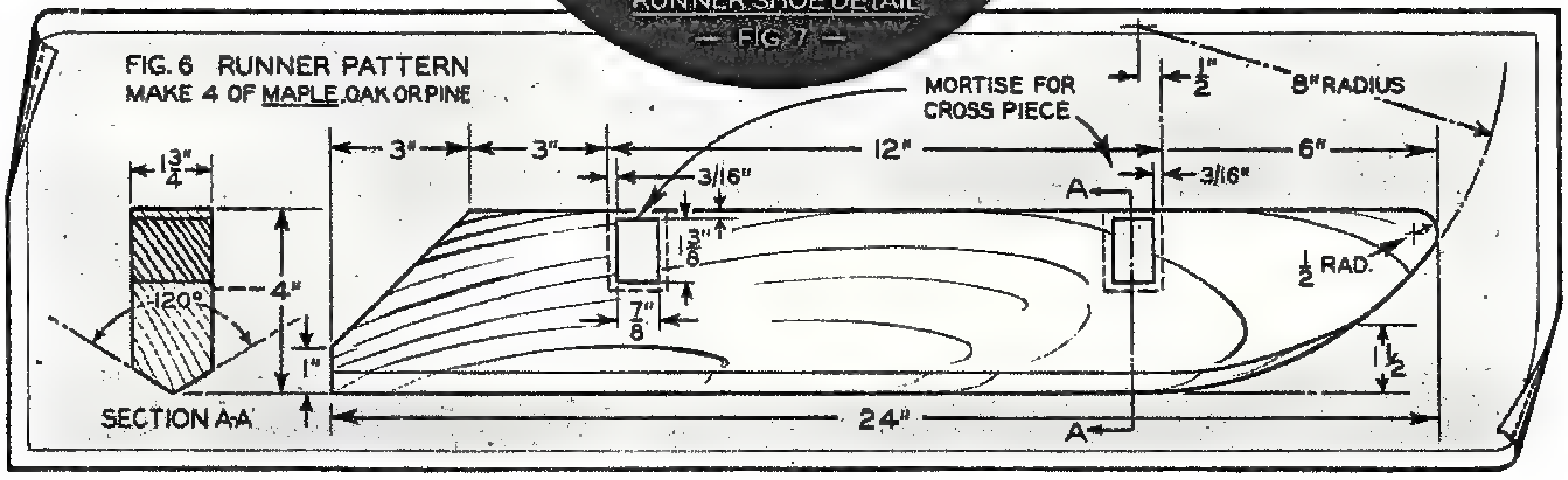
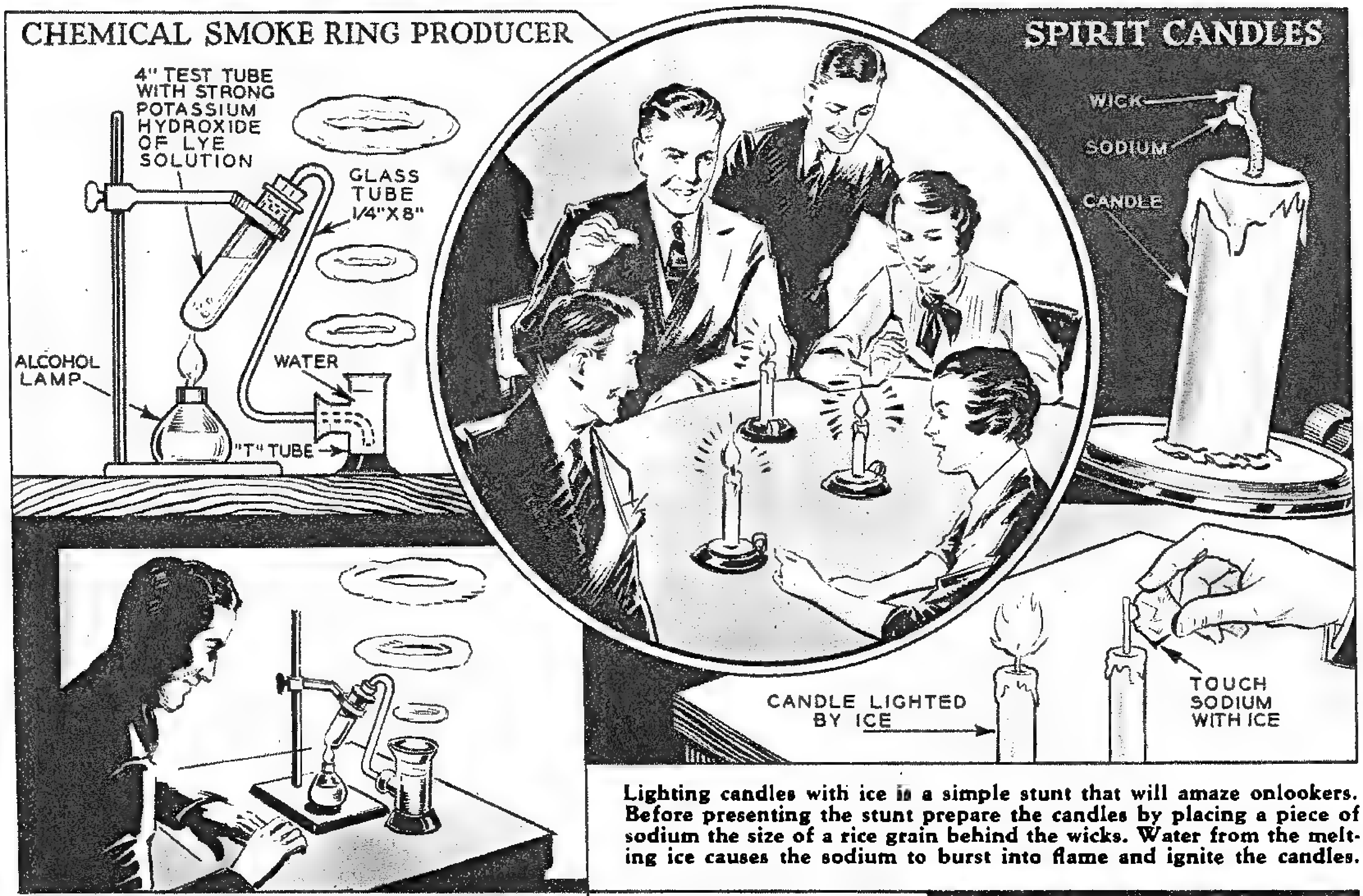


FIG. 5 UNIVERSAL BLOCK
• MAKE 1 THUS OF HARDWOOD

FIG. 6 RUNNER PATTERN
MAKE 4 OF MAPLE, OAK OR PINE



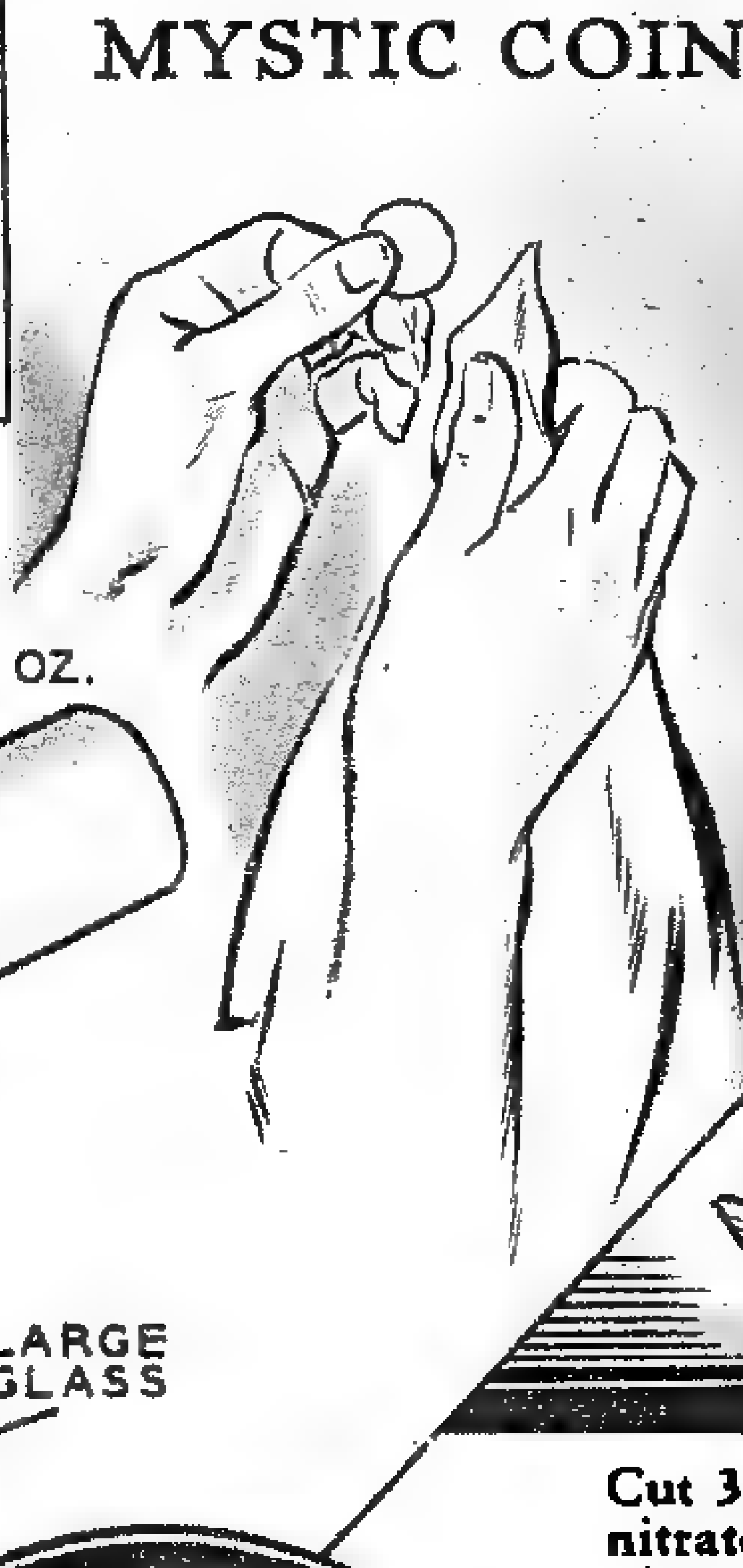
Performing Magic With Chemicals


CHEMICAL SMOKE RING PRODUCER
4" TEST TUBE WITH STRONG POTASSIUM HYDROXIDE OF LYE SOLUTION
GLASS TUBE 1/4"X8"
ALCOHOL LAMP
WATER
"T" TUBE
SPIRIT CANDLES
WICK
SODIUM
CANDLE
CANDLE LIGHTED BY ICE
TOUCH SODIUM WITH ICE

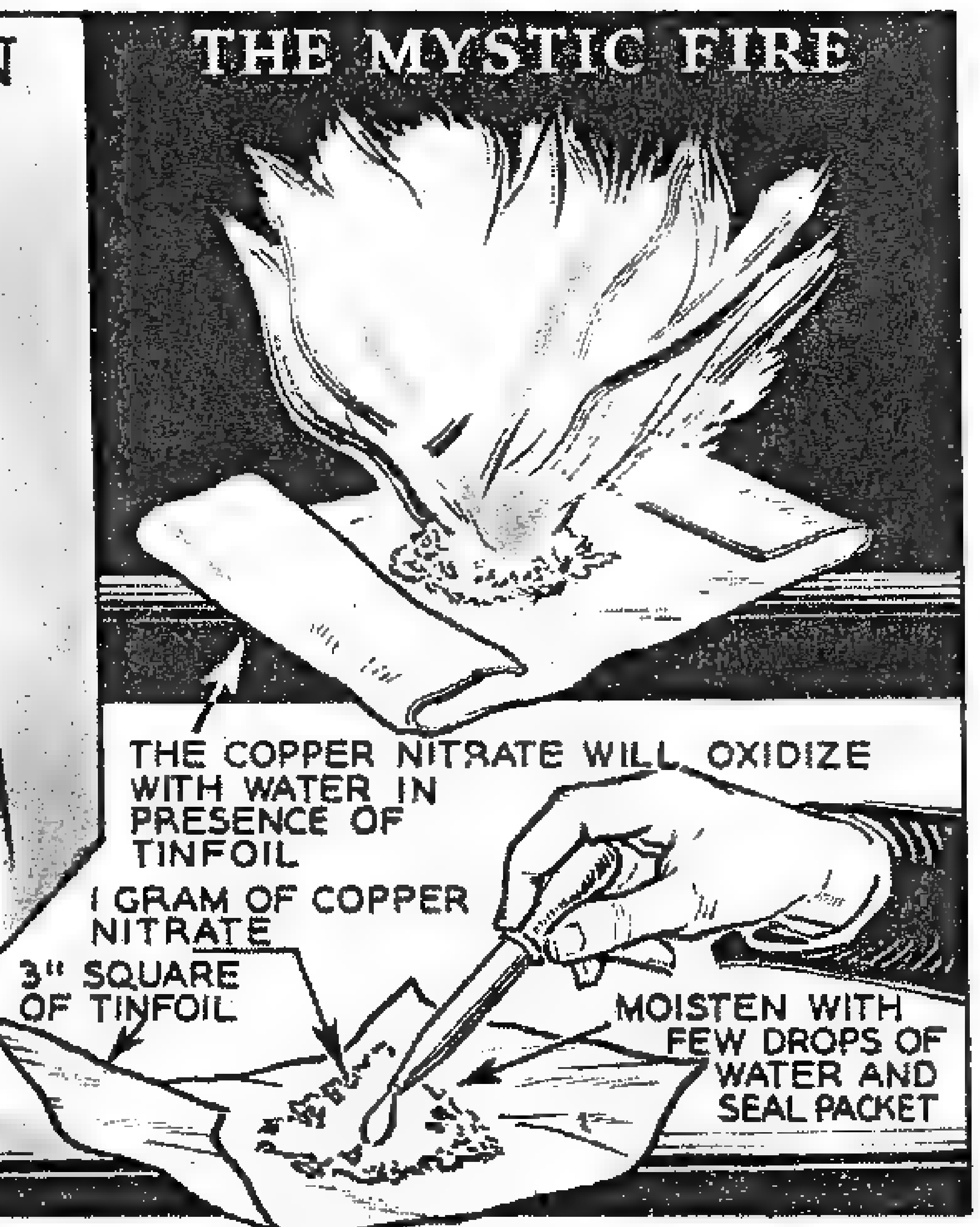
Lighting candles with ice is a simple stunt that will amaze onlookers. Before presenting the stunt prepare the candles by placing a piece of sodium the size of a rice grain behind the wicks. Water from the melting ice causes the sodium to burst into flame and ignite the candles.

Uniform smoke rings can be produced with the apparatus shown above. Partly fill a 4-inch test tube with a potassium hydroxide solution to which has been added three pea-sized pieces of phosphorus. Insert cork in test tube attaching to it a length of glass tubing connecting to a T tube. To produce smoke rings heat test tube over alcohol lamp.

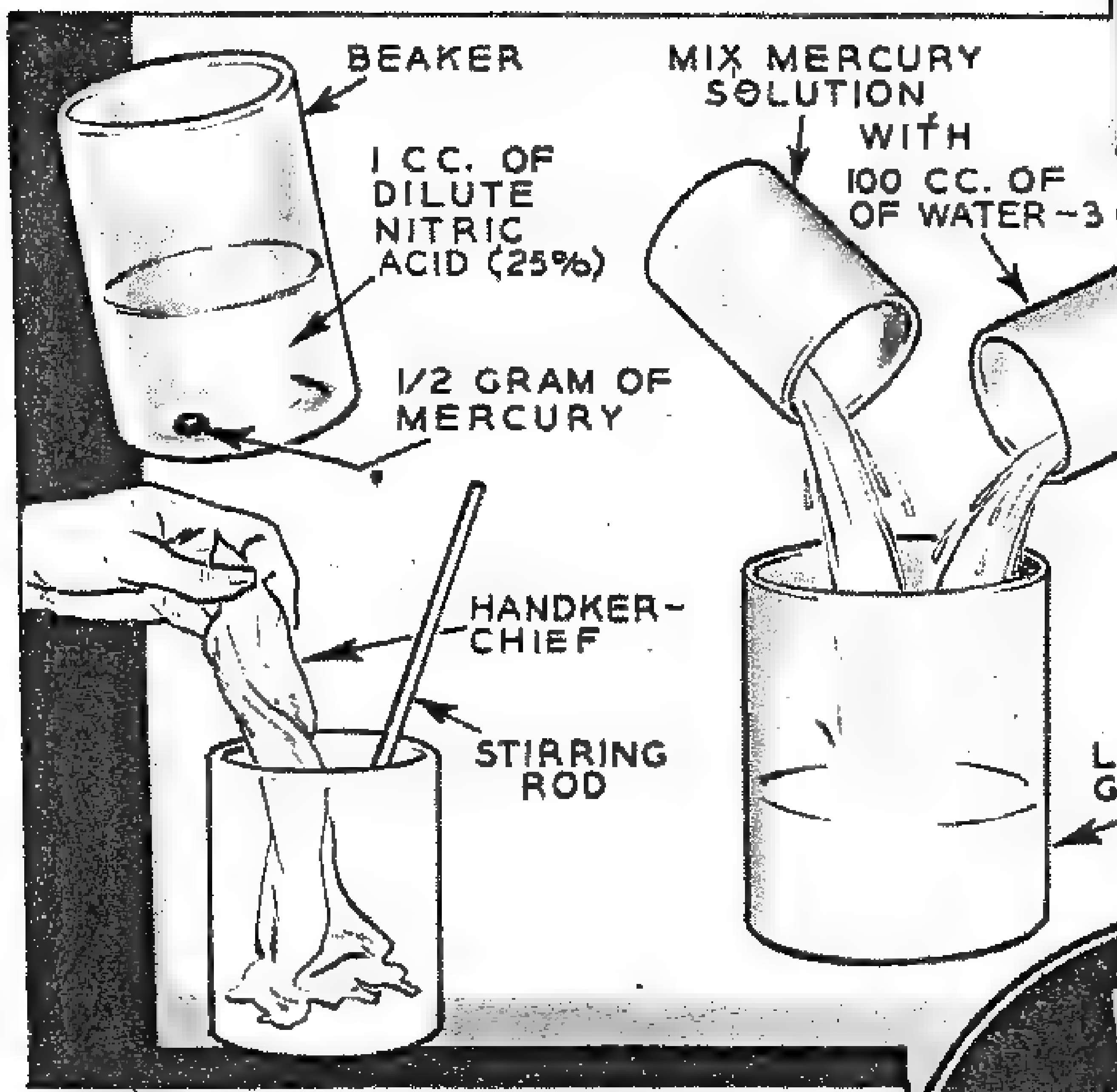
MYSTIC COIN



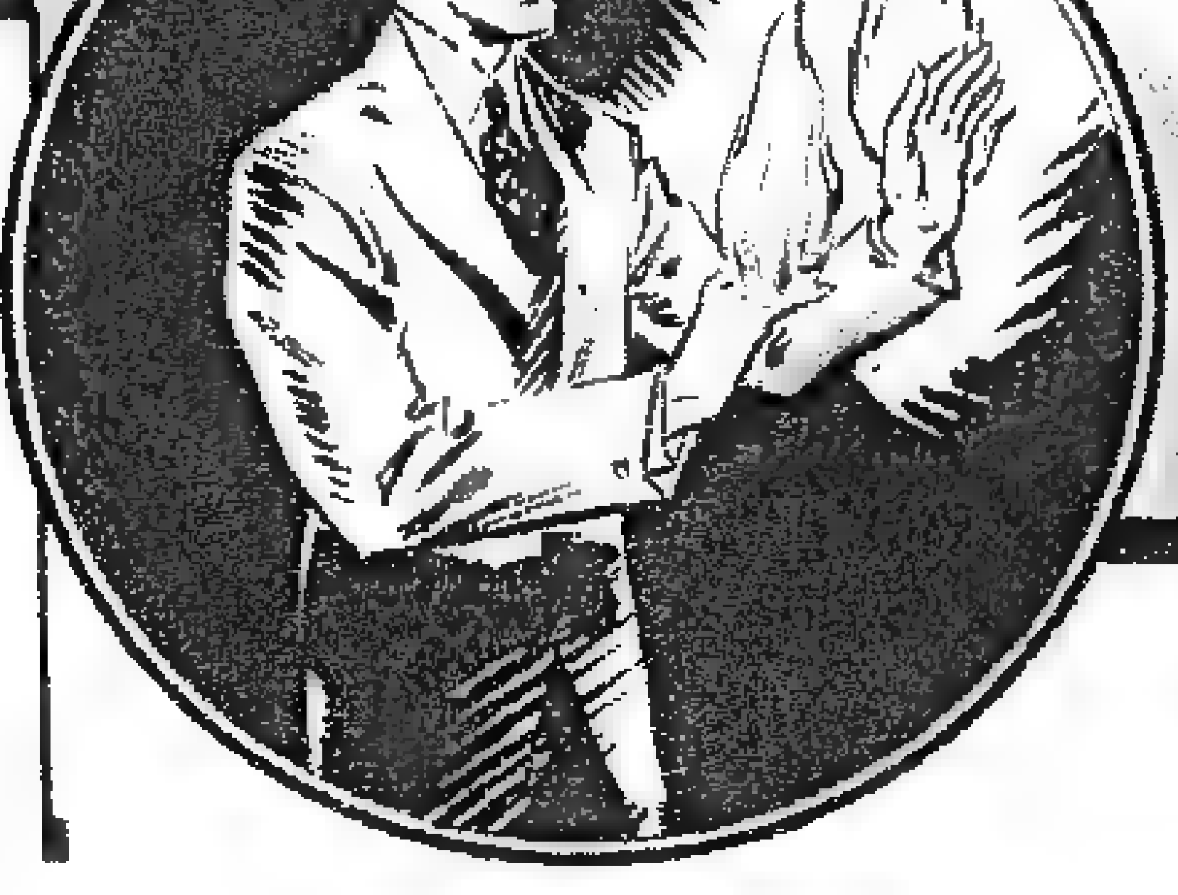
THE MYSTIC FIRE


THE COPPER NITRATE WILL OXIDIZE WITH WATER IN PRESENCE OF TINFOIL
1 GRAM OF COPPER NITRATE
3" SQUARE OF TINFOIL
MOISTEN WITH FEW DROPS OF WATER AND SEAL PACKET

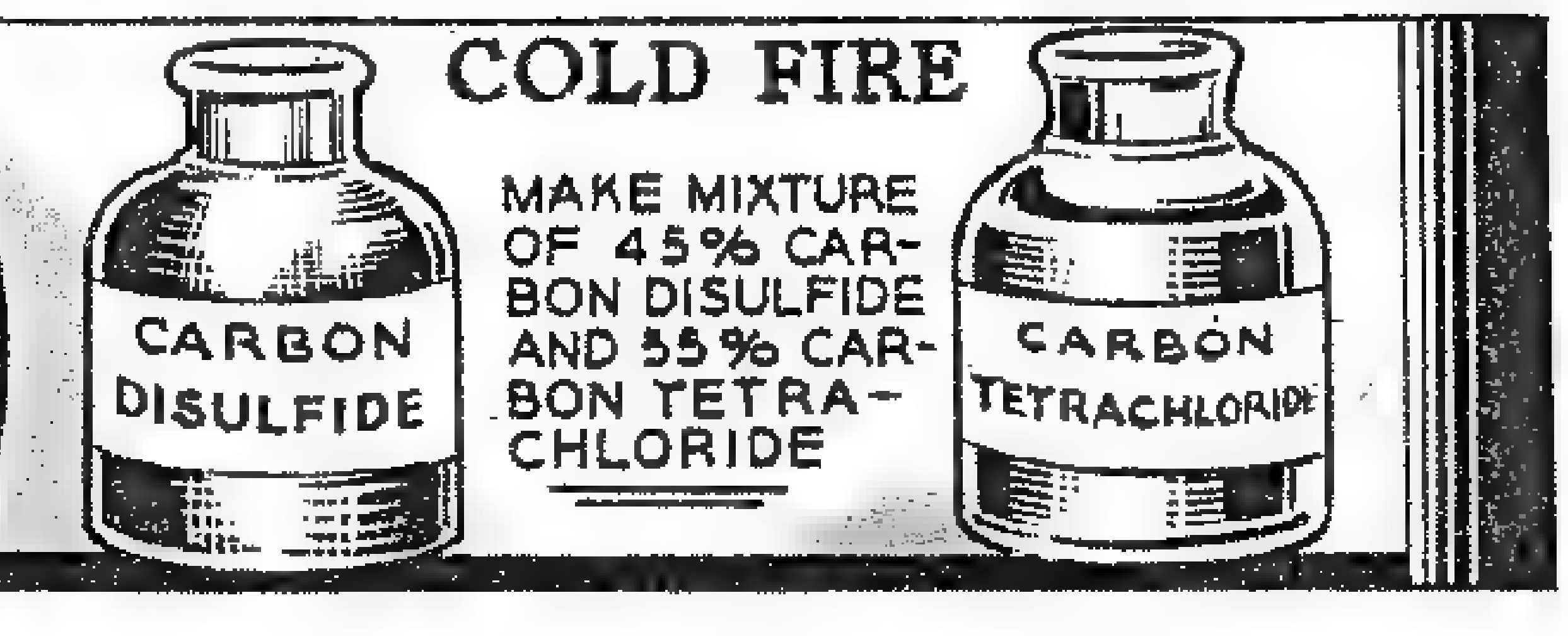
Cut 3-inch squares tinfoil and place 1-gram copper nitrate in center and wrap up. Thrilling sparks displays are produced when packets are dipped into water and removed to allow the tinfoil to oxidize.


BEAKER
1 CC. OF DILUTE NITRIC ACID (25%)
1/2 GRAM OF MERCURY
MIX MERCURY SOLUTION WITH 100 CC. OF OF WATER~3 OZ.
HANDKERCHIEF
STIRRING ROD
LARGE GLASS

A copper coin when rubbed with this magic handkerchief changes to silver right before the eyes of spectators. The handkerchief is secretly treated with a mercury plating solution and allowed to dry. Mix the solution in manner described above. Mercury requires 24 hours to dissolve.

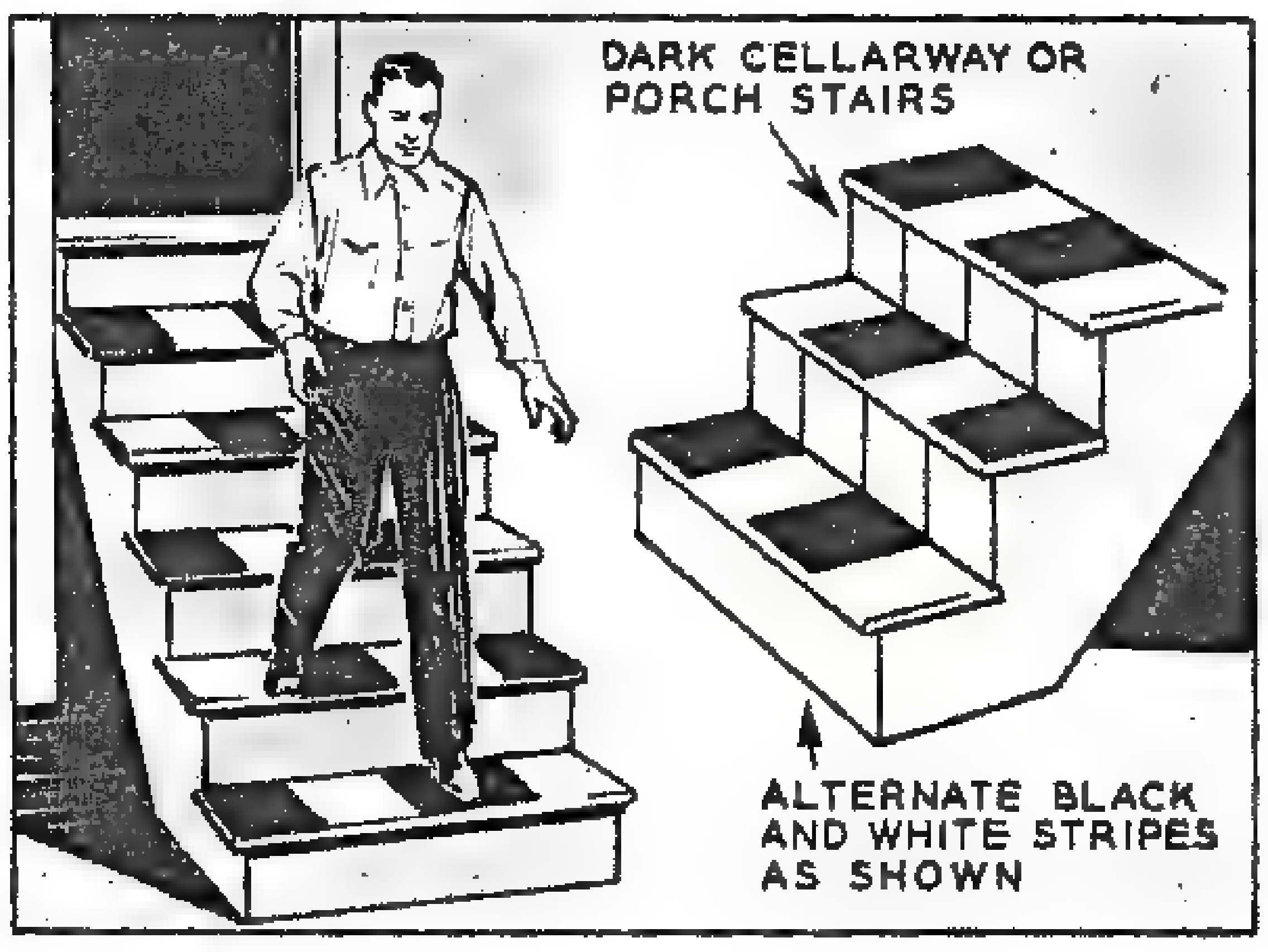


COLD FIRE


CARBON DISULFIDE
MAKE MIXTURE OF 45% CARBON DISULFIDE AND 55% CARBON TETRACHLORIDE
CARBON TETRACHLORIDE

A mixture of 45% carbon disulphide and 55% carbon tetrachloride may be ignited and allowed to burn on hands without the least harm. In performing stunt be careful not to inhale sulphur vapor.

Timely Tips for Homemakers

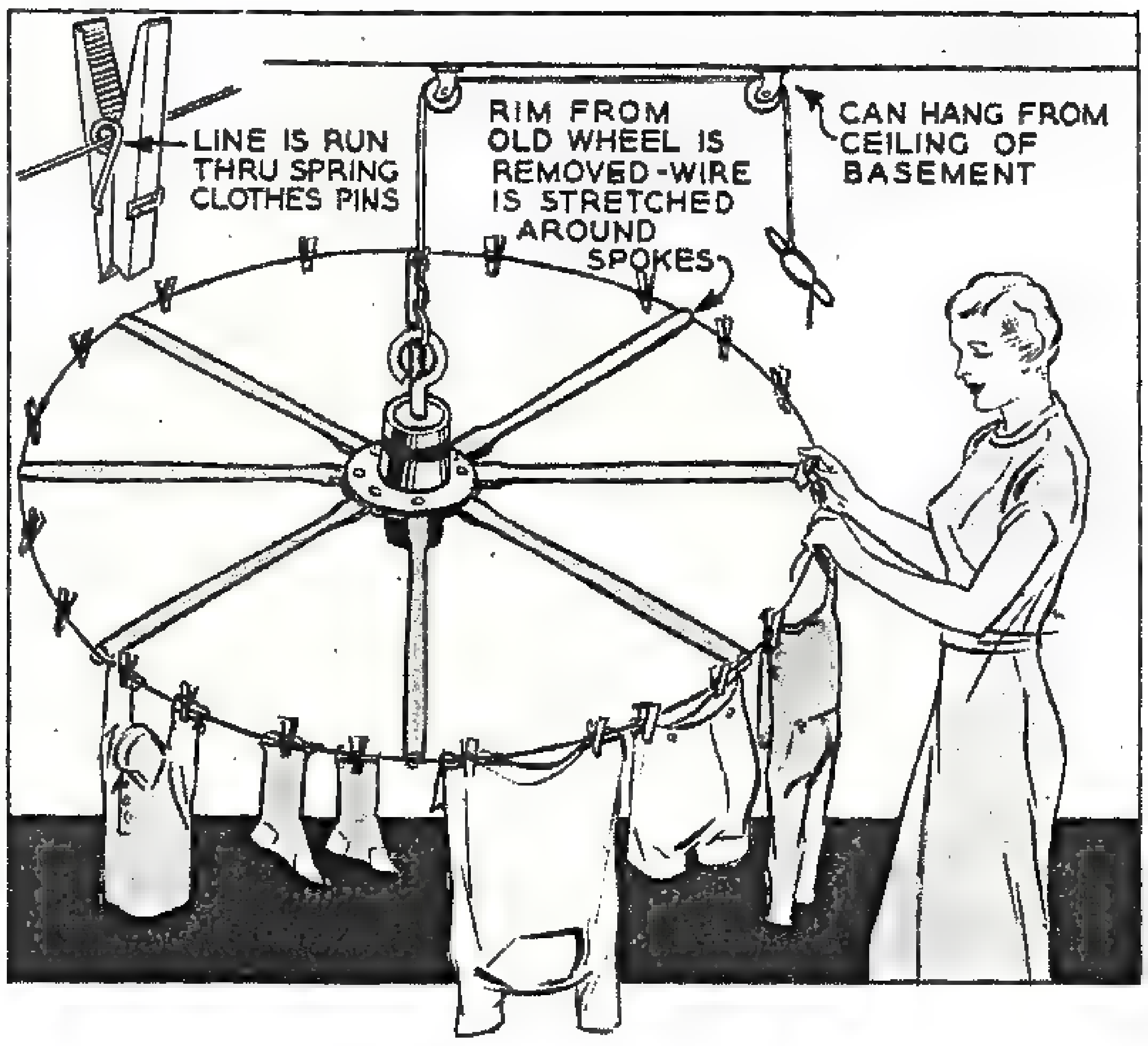

DARK CELLARWAY OR PORCH STAIRS
ALTERNATE BLACK AND WHITE STRIPES AS SHOWN

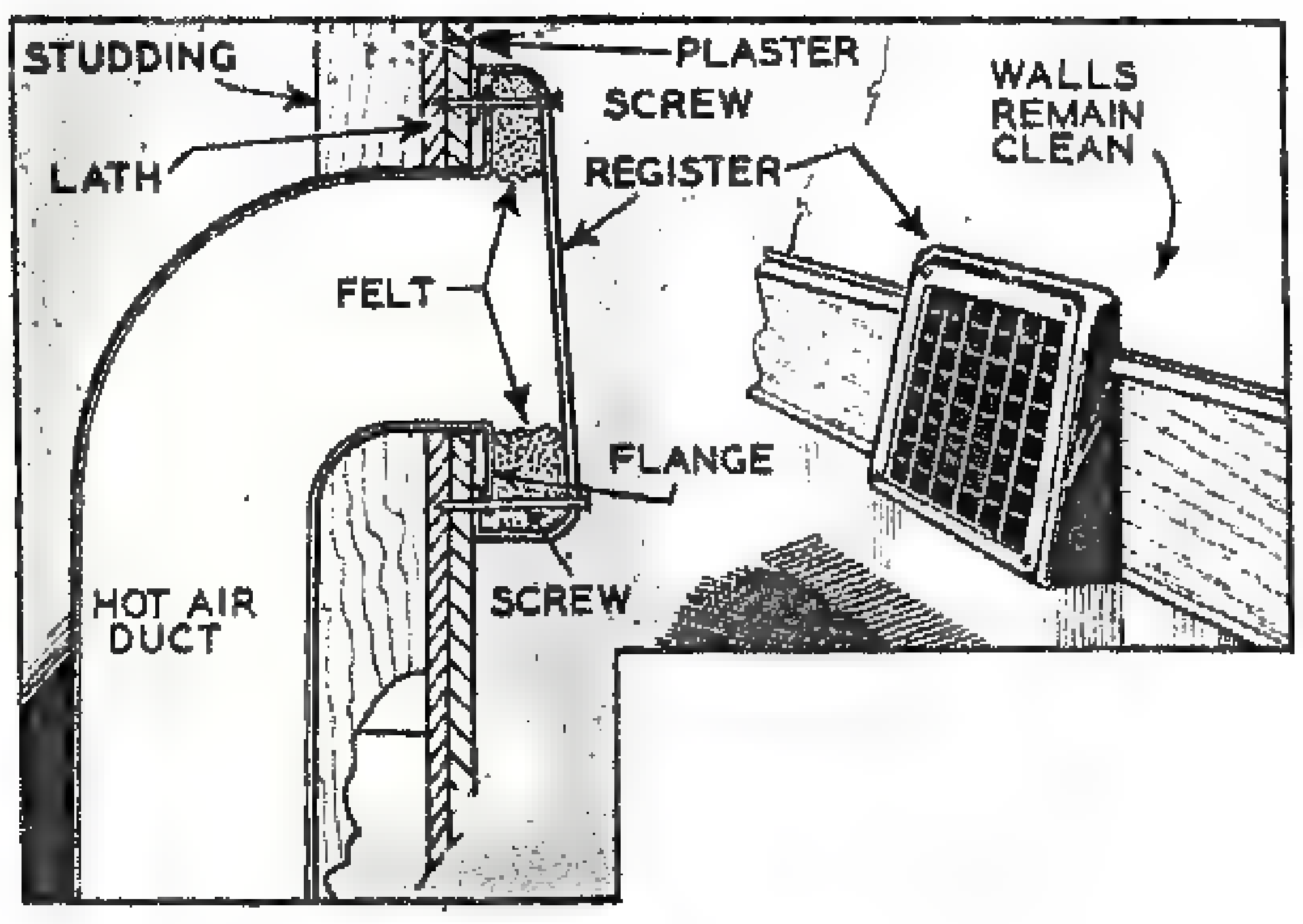
Stripes On Stairs Prevent Falls

PORCH or basement stairs which are inadequately lighted are very often the cause of serious falls. Stairs which are unsafe can be provided with a valuable safety factor by painting them with black and white stripes in checkerboard fashion. When painted in the prescribed manner the stairs will be visible even in almost total darkness due to the extreme contrast of the black and white paint.—A. H. Waychoff, Tempe, Arizona.

Wheel Forms Clothes Drier

A VERY serviceable basement clothes drying rack can be formed from a buggy or cart wheel which is no longer suited for its intended purpose. Remove the steel rim so that only the hub and spokes remain, drill holes in the end of each spoke and thread a heavy iron wire through the holes. Insert a hook in the hub of the wheel for attaching to an overhead pulley so the wheel can be raised to the ceiling when not in use. If spring type clothes pins are attached to the wire line at the time it is being threaded through the spoke holes the rack's convenience is increased considerably since fumbling for clothes pins is eliminated.—A. H. Waychoff.


LINE IS RUN THRU SPRING CLOTHES PINS
RIM FROM OLD WHEEL IS REMOVED-WIRE IS STRETCHED AROUND SPOKES
CAN HANG FROM CEILING OF BASEMENT

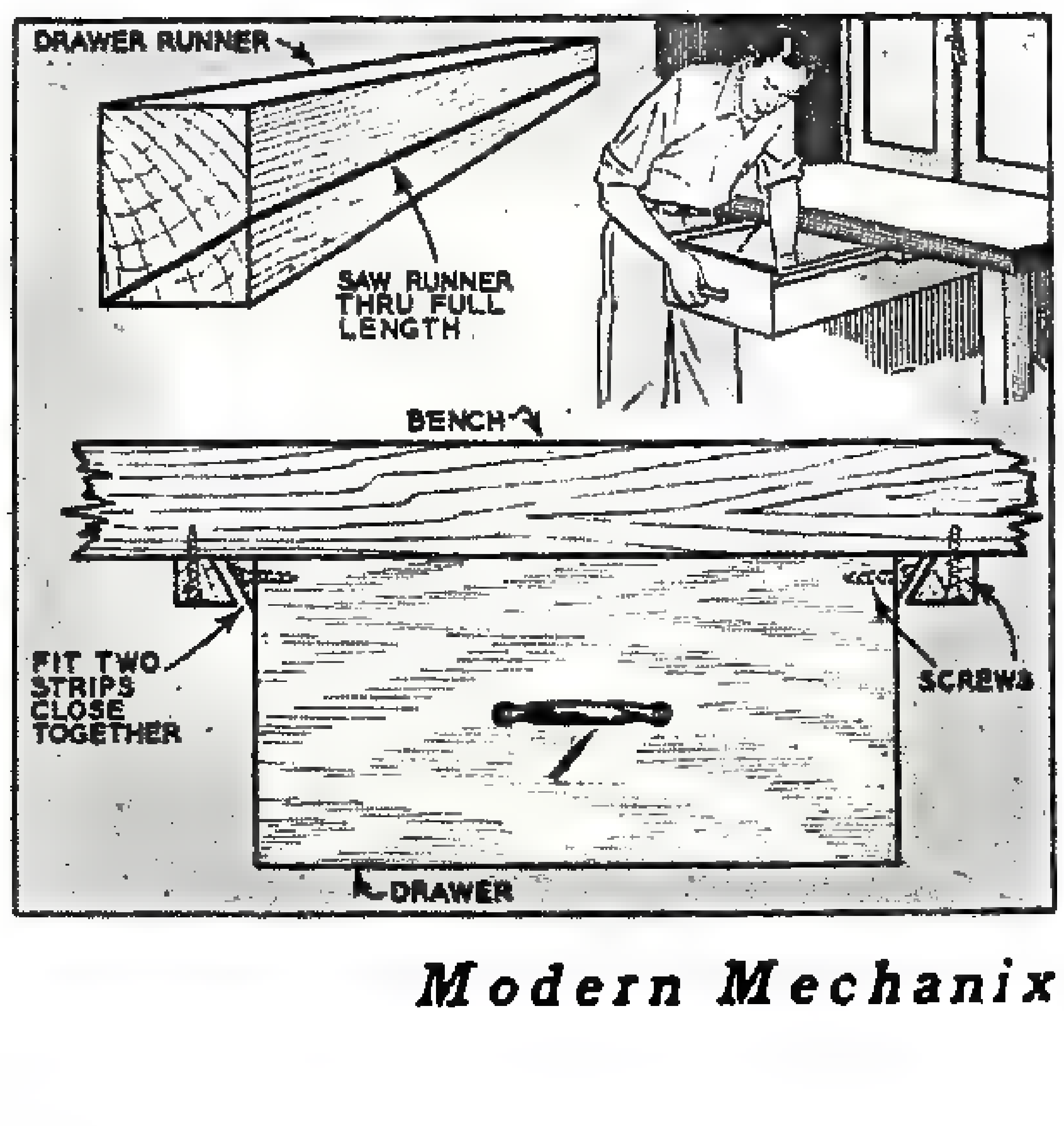

STUDDING
PLASTER
SCREW
WALLS REMAIN CLEAN
LATH
REGISTER
FELT
FLANGE
HOT AIR DUCT
SCREW

Felt Prevents Register Soiling Walls

WALLS which show soil marks around hot air registers can be protected against future damage by sealing the space between wall and register plate with a felt gasket. Remove the register grill and attach a strip of felt around the edges with shellac. Replace the register and the gap through which the soot escaped is sealed thus protecting the walls from future damage.—E. J. Novak, Omaha, Nebr.

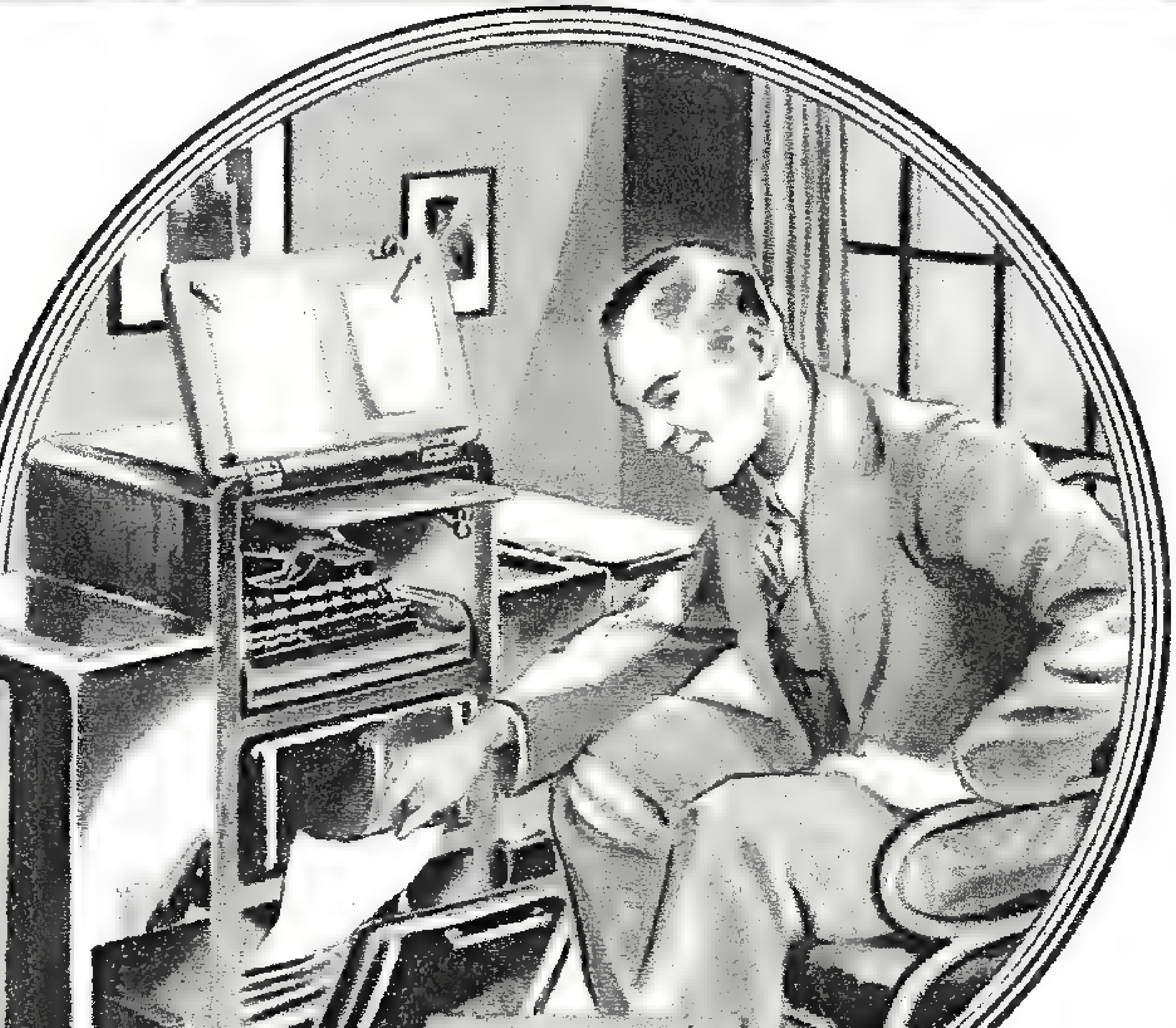
Drawer Slides Easily Made

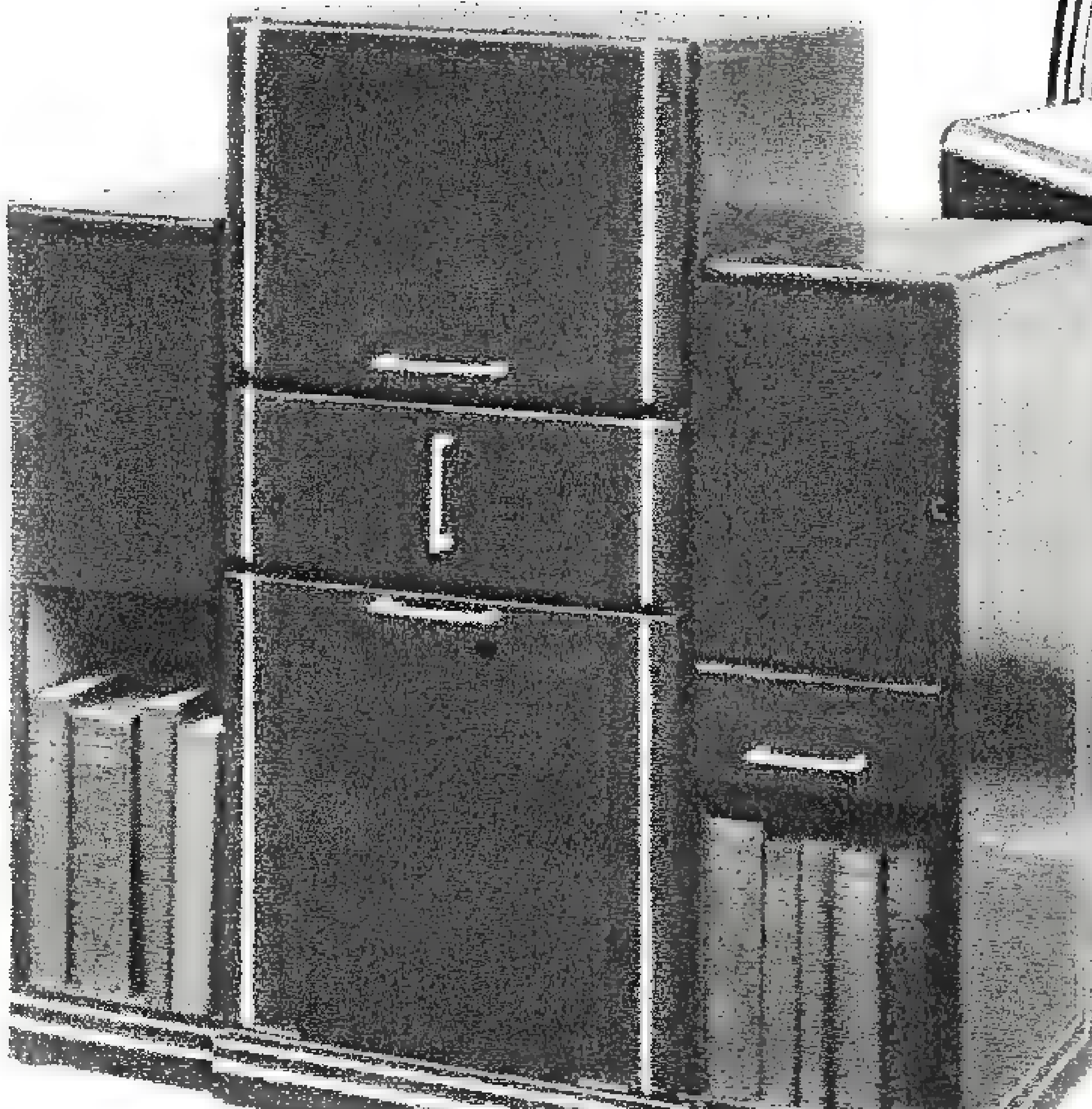
WHERE a drawer is to be attached to a workbench or table difficulties usually arise in determining a method for fastening it to suitable runners. When milled runners are not available a satisfactory substitute can be made by cutting a length of strip stock to form a triangular and trapezium runner. Attach the triangular runner to the drawer with wood screws. The trapezium pieces should be fastened to the workbench or table in a similar manner. Adjust runners so that the drawer will slide freely.—Martin Straka, Ney, Ohio.


DRAWER RUNNER
SAW RUNNER THRU FULL LENGTH
BENCH
FIT TWO STRIPS CLOSE TOGETHER
SCREWS
DRAWER

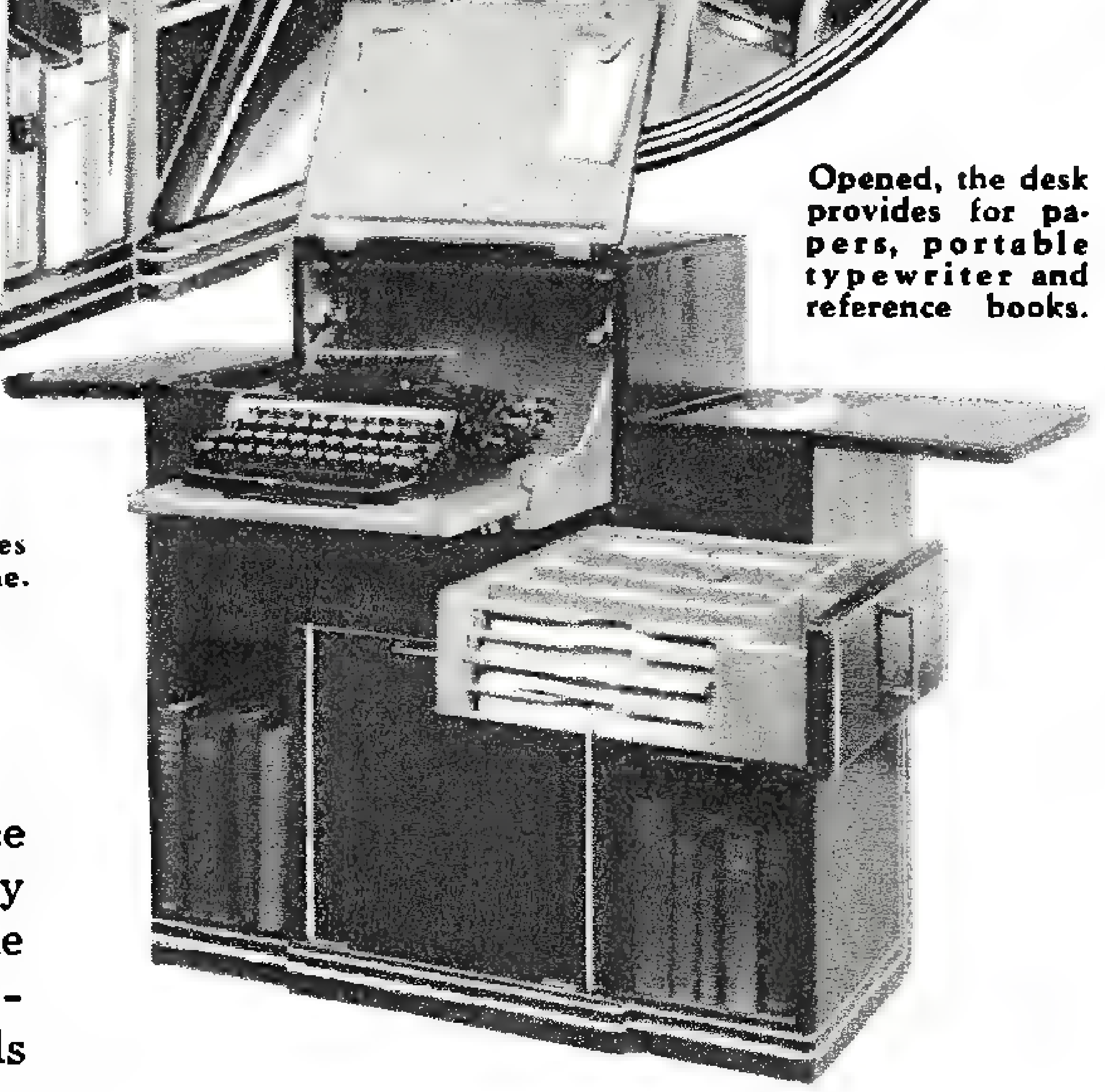
A MODERN STYLED TYPEWRITER DESK FOR THE WORKSHOP FAN

Anyone without special tools can duplicate this attractive desk. When not in use the desk folds into a compact unit.





Finished in glossy enamel this modern desk when closed makes at attractive piece of furniture that will enhance any home.



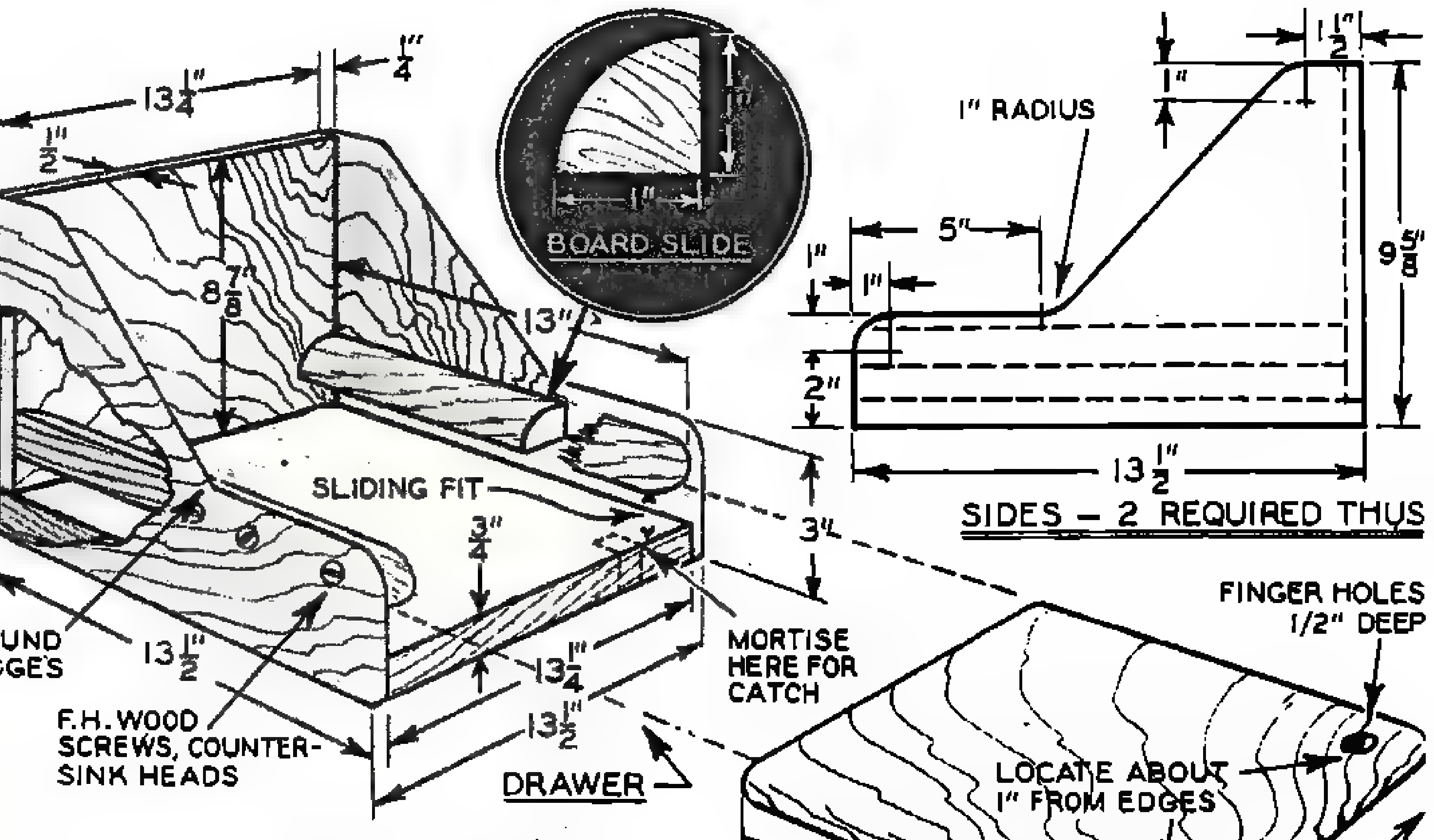
Opened, the desk provides for papers, portable typewriter and reference books.

by John Steinke

A LIFT, pull and twist, converts this piece of modernistic furniture into a very efficient typewriter desk. The door over the typewriter shelf opens to become the copyholder, the drawer under the typewriter pulls out and turns so your stationery is at your finger tips, lift the side lids and there are your file pockets. At the right a utility drawer is provided for reference books and in the center of the desk there is a large supply compartment. The typewriter compartment will take any portable machine. With all of this storage space available the desk requires only a 15" by 30" space.

Although the desk may appear to be a complicated cabinet job it is really easy to build. Since the completed desk is enamel finished simple butt joints will be satisfactory. Plywood is suggested as the best material for the desk. The cutting charts in Figure 6 suggest how to layout the desk pieces on standard size sheets.

A few pieces need a little written suppliment. For instance, the bottom strip which is detailed in Figure 2. Note that the finished desk is enhanced with silver lines. These lines relieve the solid color and do much to give the desk its striking appearance. They are made by filling saw cuts, with a suitable wood filler.


BOARD SLIDE
1"
1/4"
13 1/4"
1/4"
1/2"
8 7/8"
9 5/8"
13"
SLIDING FIT
3/4"
ROUND EDGES
13 1/2"
13 1/4"
13 1/2"
F.H. WOOD SCREWS, COUNTERSINK HEADS
MORTISE HERE FOR CATCH
DRAWER
3"
1" RADIUS
1 1/2"
1"
5"
1"
1"
2"
9 5/8"
13 1/2"
SIDES – 2 REQUIRED THUS
FINGER HOLES 1/2" DEEP
LOCATE ABOUT 1" FROM EDGES
13"
13 1/8
TYPEWRITER BOARD

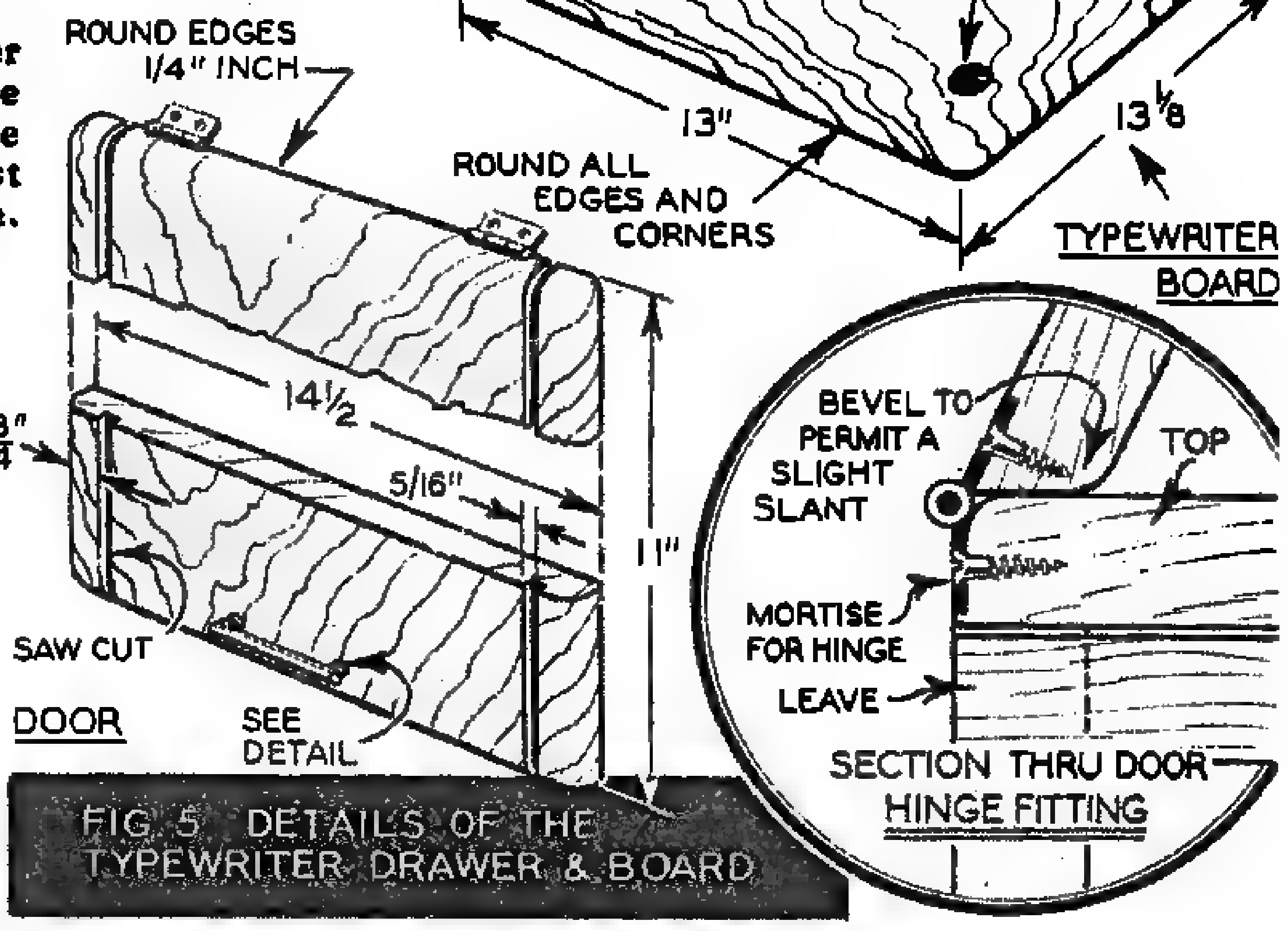
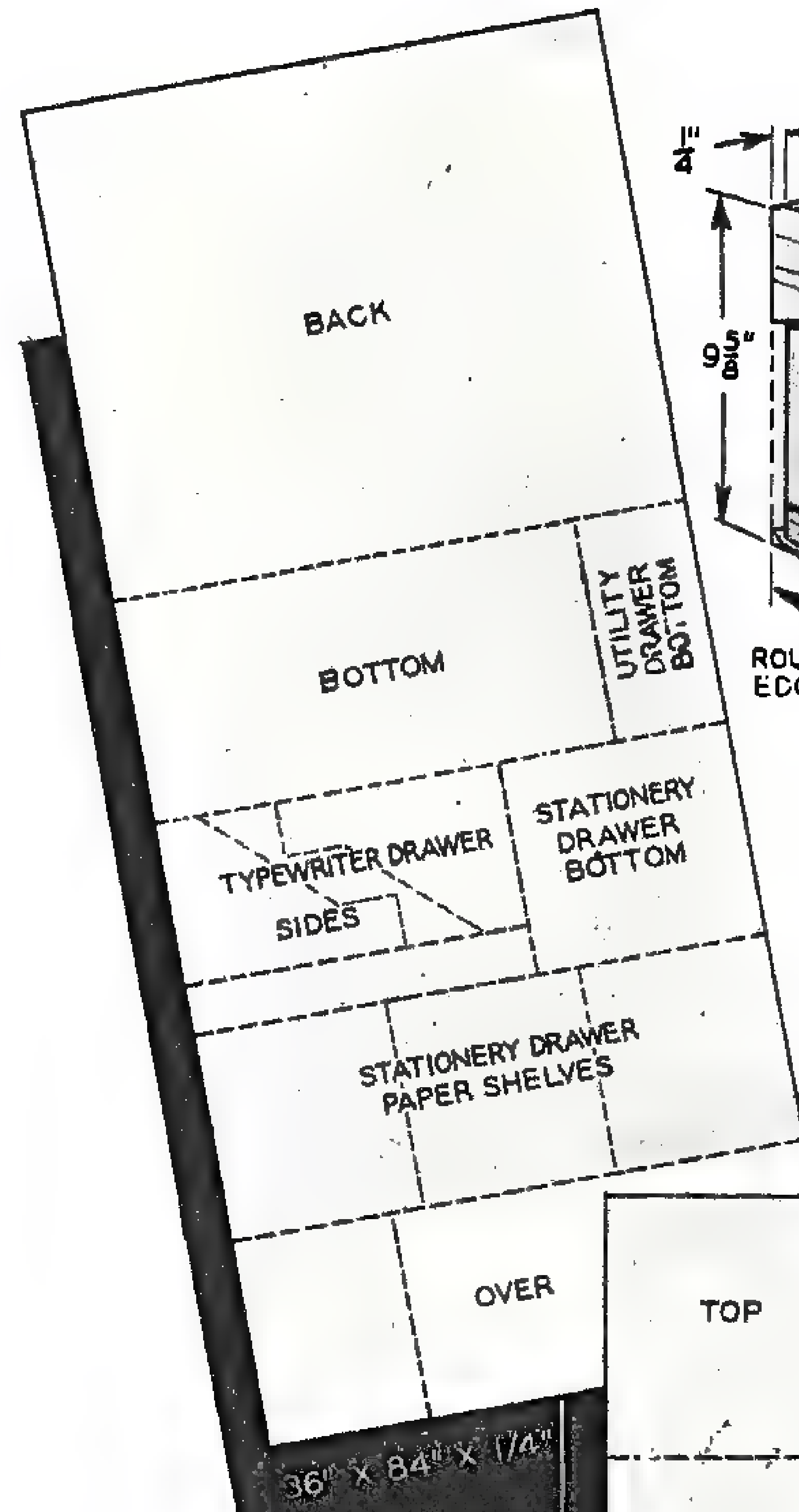
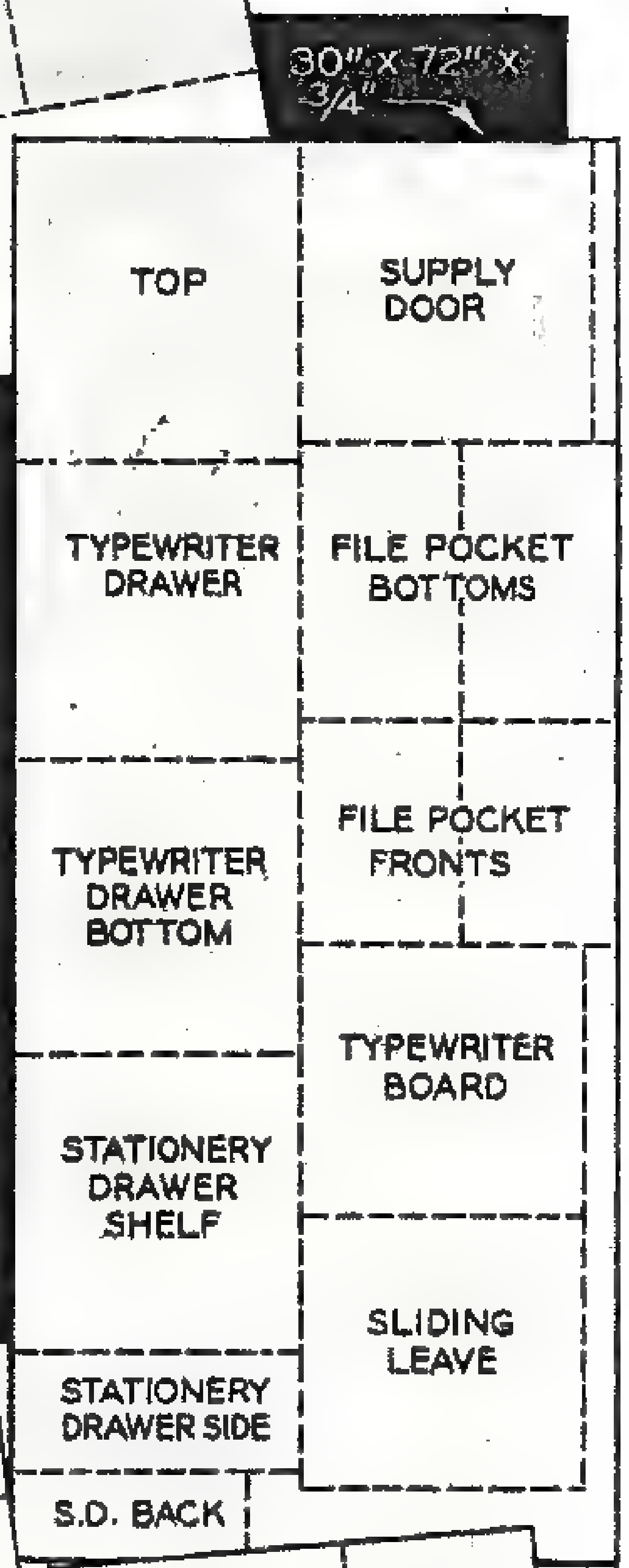

ROUND EDGES 1/4" INCH
ROUND ALL EDGES AND CORNERS
14 1/2
3/4
5/16"
11"
SAW CUT
DOOR
SEE DETAIL
BEVEL TO PERMIT A SLIGHT SLANT
TOP
MORTISE FOR HINGE
LEAVE
SECTION THRU DOOR HINGE FITTING

FIG. 5 DETAILS OF THE TYPEWRITER DRAWER & BOARD

Typewriter drawer and slide are made according to these plans. Slide must be free to move.


BACK
BOTTOM
UTILITY DRAWER BOTTOM
TYPEWRITER DRAWER SIDES
STATIONERY DRAWER BOTTOM
STATIONERY DRAWER PAPER SHELVES
OVER
36" X 84" X 1/4"


30" X 72" X 3/4"
TOP
SUPPLY DOOR
TYPEWRITER DRAWER
FILE POCKET BOTTOMS
TYPEWRITER DRAWER BOTTOM
FILE POCKET FRONTS
TYPEWRITER BOARD
STATIONERY DRAWER SHELF
SLIDING LEAVE
STATIONERY DRAWER SIDE
S.D. BACK

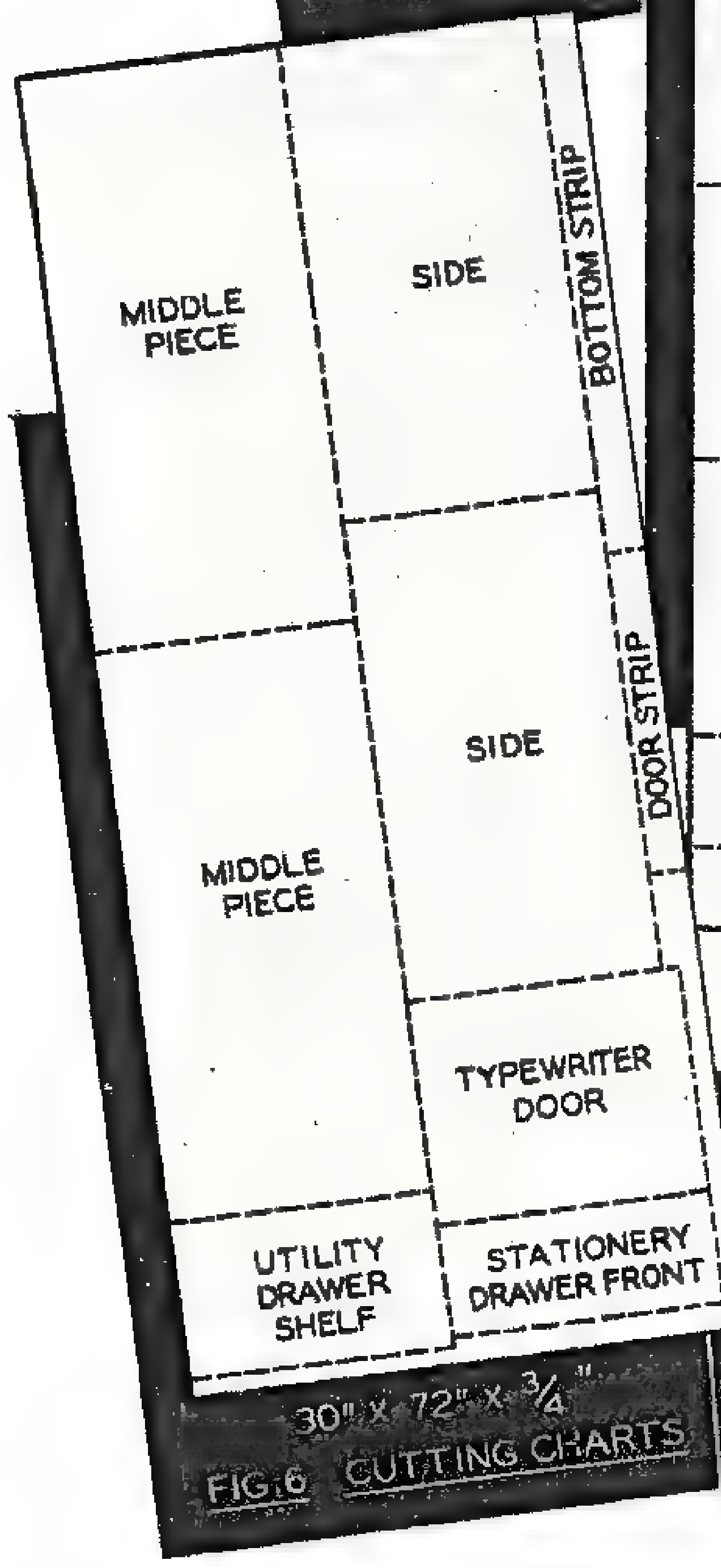
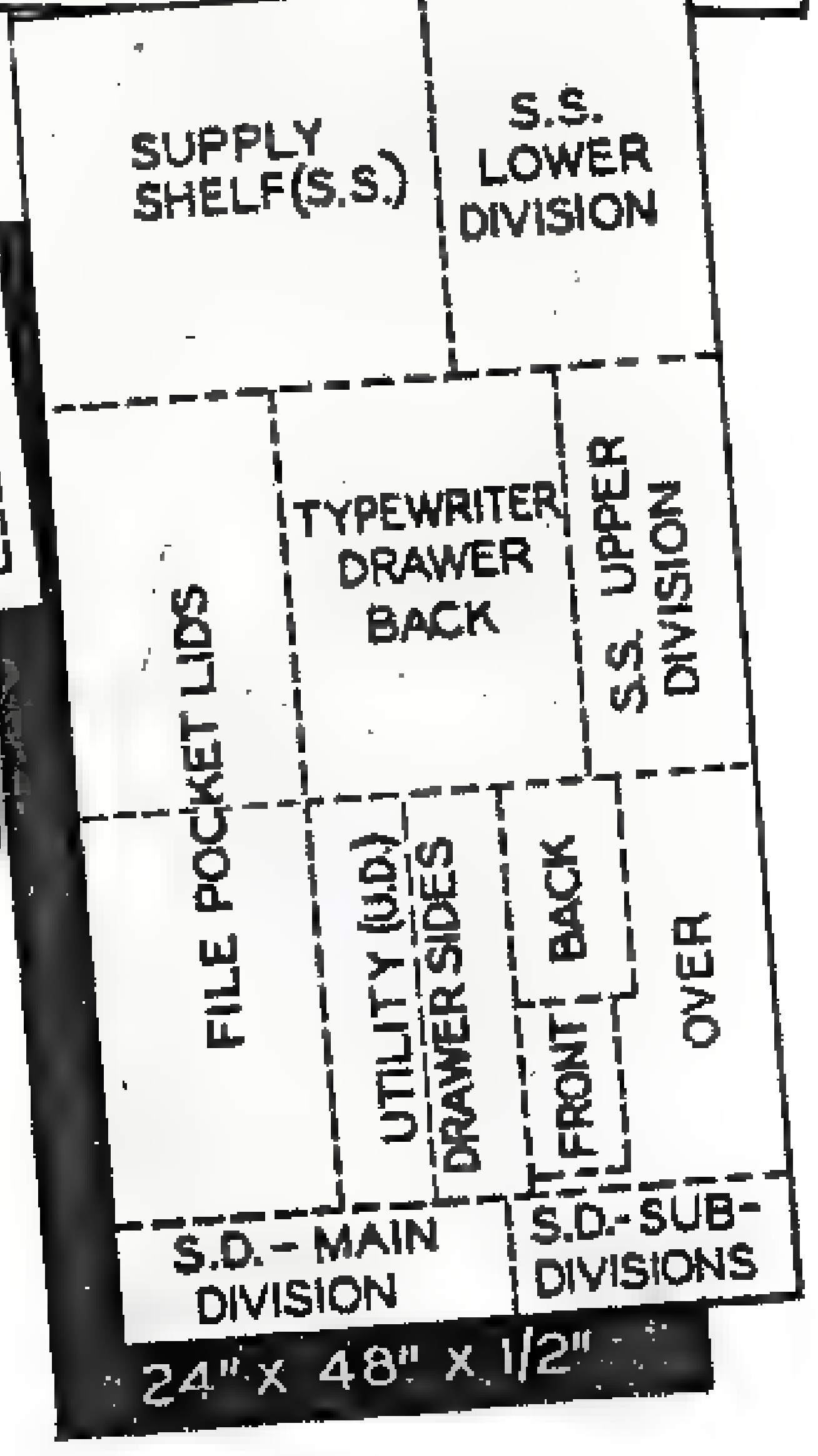

MIDDLE PIECE
SIDE
BOTTOM STRIP
DOOR STRIP
SIDE
MIDDLE PIECE
TYPEWRITER DOOR
UTILITY DRAWER SHELF
STATIONERY DRAWER FRONT
30" X 72" X 3/4"

FIG. 6 CUTTING CHARTS


SUPPLY SHELF (S.S.)
S.S. LOWER DIVISION
TYPEWRITER DRAWER BACK
S.S. UPPER DIVISION
FILE POCKET LIDS
UTILITY (U.D.) DRAWER SIDES
FRONT
BACK
OVER
S.D. - MAIN DIVISION
S.D. - SUB-DIVISIONS
24" X 48" X 1/2"

In order to reduce the materials cost as much as possible standard pieces of plywood are cut to the sizes indicated in the above charts. This method eliminates all waste and simplifies work.

Two wide lines run up the front panel of the desk. Check the supply door, stationery drawer front and the typewriter door, making the front panel carefully so your lines do not stagger. These lines are 3/4" from the side and 5/16" wide. It is advised that you make the shelves under the drawers from flat pieces rather than the usual frame. It saves time, is easier and costs but little more. Don't forget to round the front edges of the drawers and doors about 1/4". The lids on the file pockets and the board on which the machine is placed are rounded on all edges and corners. Round all projecting edges of the typewriter drawer itself. The front and back edges of the leaf are rounded to fit into the sliding groove in the assembled desk. It is wise, when all your pieces are cut, to carefully sand them in the flat.

Refer to the assembly drawing in Figure 2 to give yourself a good idea of how to proceed in assemblying the desk. Note that the leaf slides are put on at once, not later. Mark the location of the middle pieces to the bottom, glue and nail, then bore holes for the dowels. This should be repeated also on most other joints. Putting on the top and back will give you a good idea of how it is built.

Next install the center shelves while they

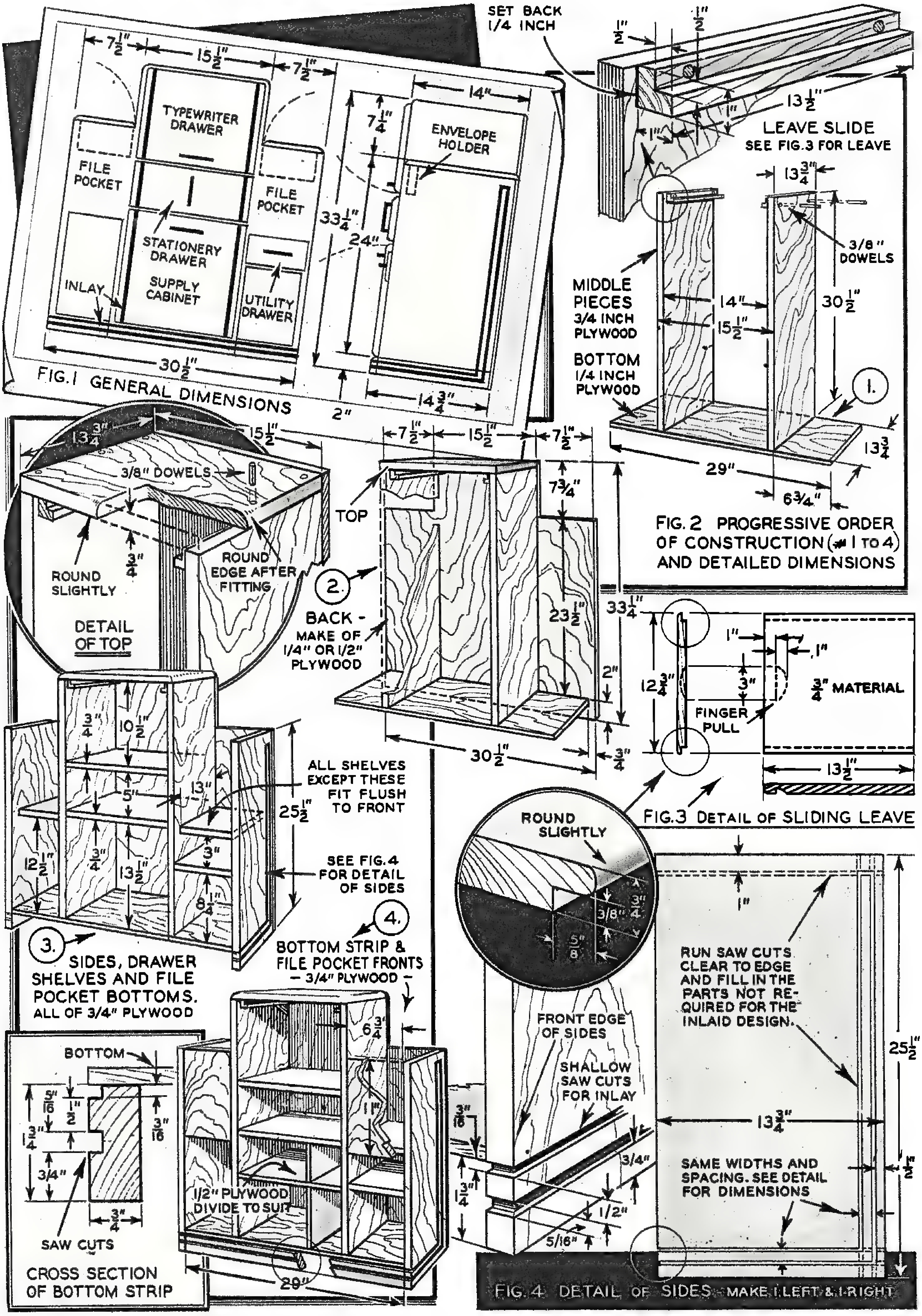


FIG. 1 GENERAL DIMENSIONS
TYPEWRITER DRAWER
FILE POCKET
STATIONERY DRAWER
SUPPLY CABINET
INLAY
UTILITY DRAWER
ENVELOPE HOLDER
7½" 15½" 7½" 14" 7¼" 33¼" 24" 30½" 2" 14¾"
SET BACK 1/4 INCH
½" ½" 1" 1" 13½"
LEAVE SLIDE
SEE FIG.3 FOR LEAVE
13¾"
3/8" DOWELS
MIDDLE PIECES 3/4 INCH PLYWOOD
BOTTOM 1/4 INCH PLYWOOD
14" 15½" 30½" 29" 6¾" 13¾"
1.
FIG. 2 PROGRESSIVE ORDER OF CONSTRUCTION (# 1 TO 4) AND DETAILED DIMENSIONS
13¾" 15½"
3/8" DOWELS
ROUND SLIGHTLY
ROUND EDGE AFTER FITTING
¾"
DETAIL OF TOP
7½" 15½" 7½" 7¾"
TOP
2.
BACK - MAKE OF 1/4" OR 1/2" PLYWOOD
23½" 33¼" 2" 30½" ¾"
¾" 10½" 5" 13" 12½" 13½" 3" 8¾" 25½"
ALL SHELVES EXCEPT THESE FIT FLUSH TO FRONT
SEE FIG.4 FOR DETAIL OF SIDES
3.
SIDES, DRAWER SHELVES AND FILE POCKET BOTTOMS. ALL OF 3/4" PLYWOOD
4.
BOTTOM STRIP & FILE POCKET FRONTS – 3/4" PLYWOOD –
1" 1" 3" 12¾" ¾" MATERIAL 13½"
FINGER PULL
FIG.3 DETAIL OF SLIDING LEAVE
BOTTOM
5/16" ½" 3/16" 1¾" 3/4" ¾"
SAW CUTS
CROSS SECTION OF BOTTOM STRIP
6¾" 11"
1/2" PLYWOOD DIVIDE TO SUIT
29"
ROUND SLIGHTLY
3/8" ¾" 5/8"
FRONT EDGE OF SIDES
SHALLOW SAW CUTS FOR INLAY
3/16" 1¾" 3/4" 1/2" 5/16"
1"
RUN SAW CUTS CLEAR TO EDGE AND FILL IN THE PARTS NOT REQUIRED FOR THE INLAID DESIGN.
13¾" 25½" ½"
SAME WIDTHS AND SPACING. SEE DETAIL FOR DIMENSIONS
FIG. 4 DETAIL OF SIDES - MAKE 1 LEFT & 1 RIGHT

General cabinet dimensions of the desk are covered in this diagram. On all joints where stress will be placed dowel pins should be used. Careful assembly will result in a workshop project that will equal many commercial desks of similar design.

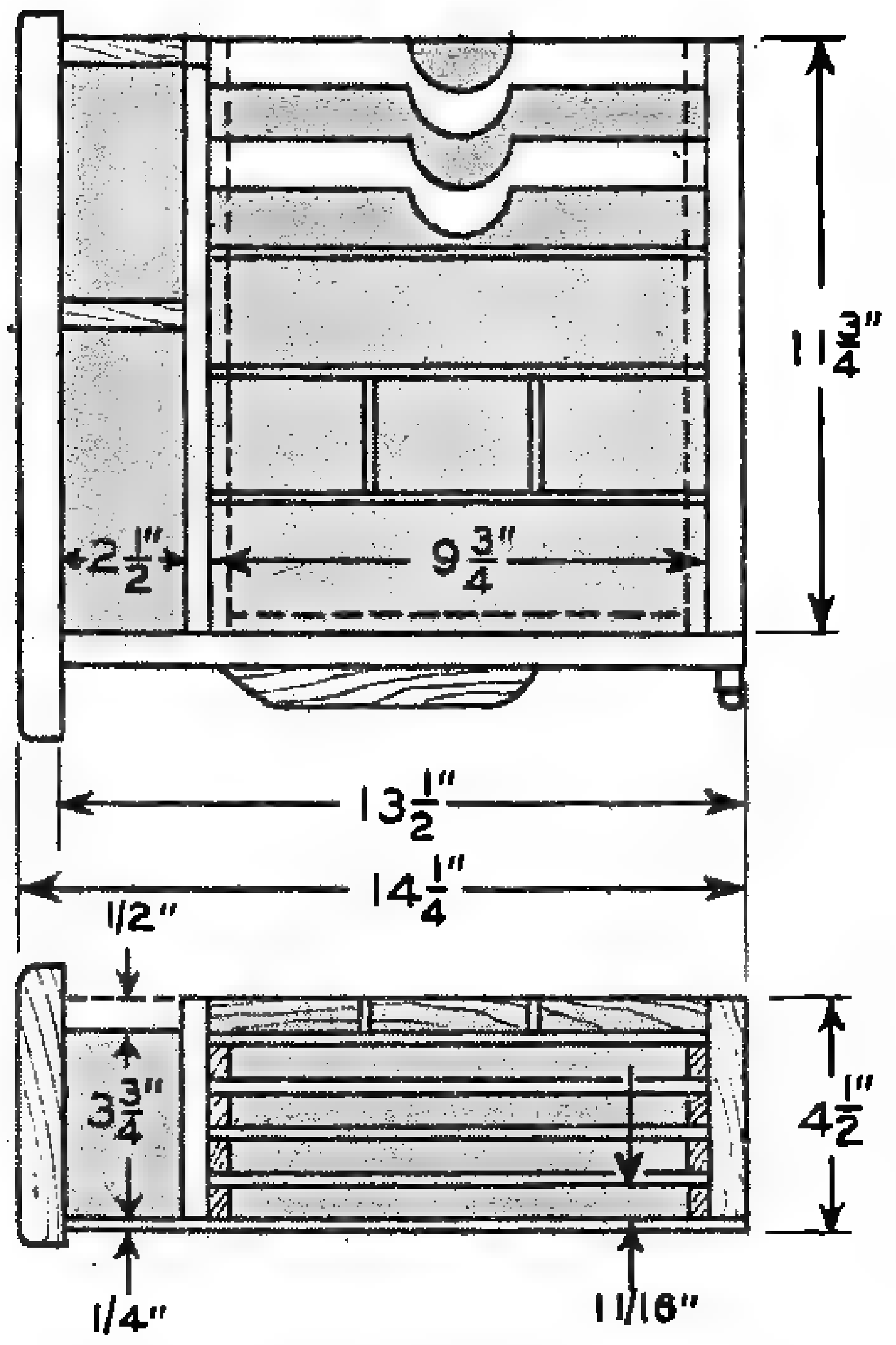

11 3/4"
2 1/2"
9 3/4"
13 1/2"
14 1/4"
1/2"
3 3/4"
4 1/2"
1/4"
11/16"

FIG. 7 PLAN VIEW & SECTION OF THE STATIONERY DRAWER

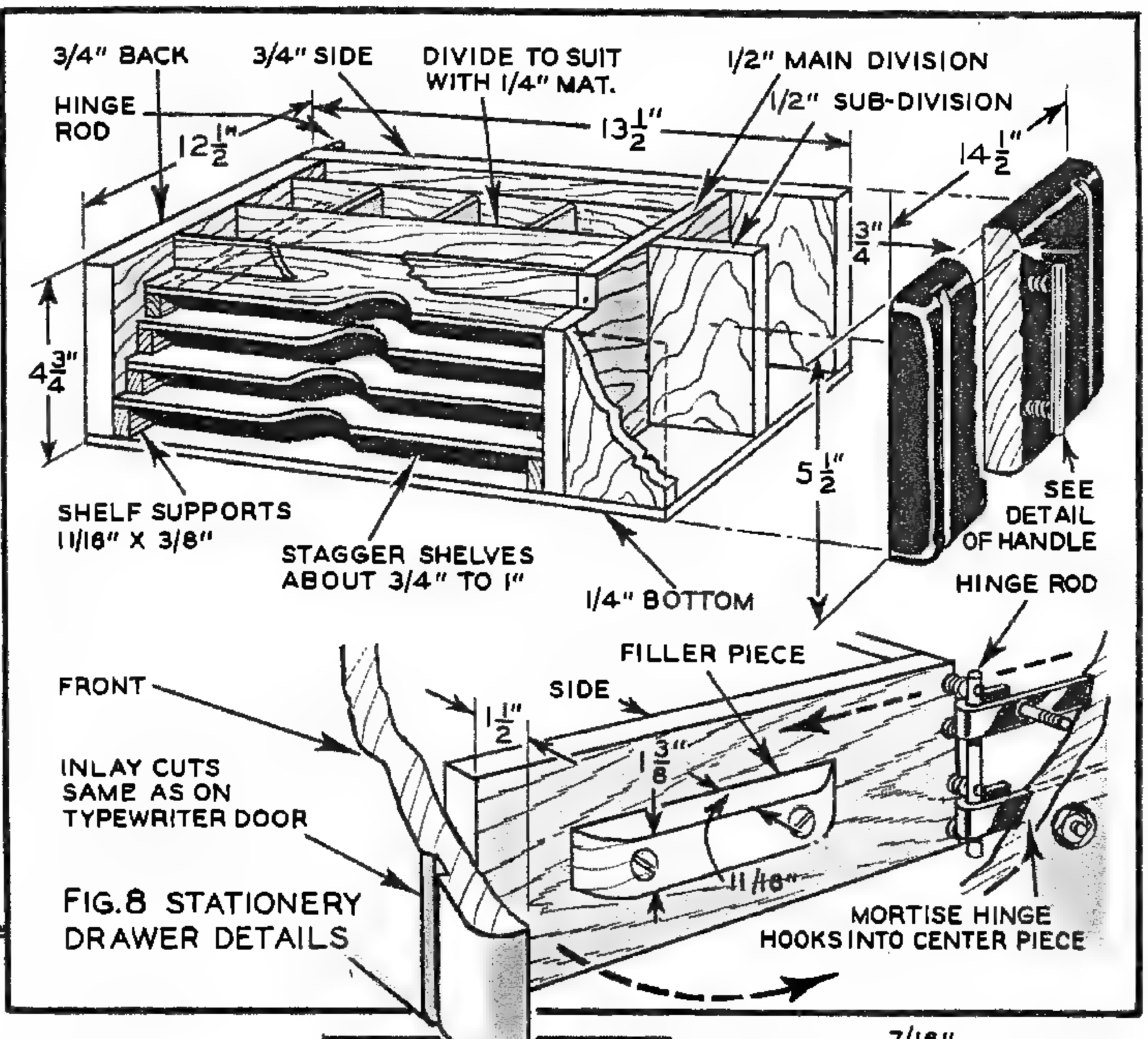

3/4" BACK
3/4" SIDE
DIVIDE TO SUIT WITH 1/4" MAT.
1/2" MAIN DIVISION
1/2" SUB-DIVISION
HINGE ROD
12 1/2"
13 1/2"
14 1/2"
3/4"
4 3/4"
5 1/2"
SEE DETAIL OF HANDLE
HINGE ROD
SHELF SUPPORTS 11/16" X 3/8"
STAGGER SHELVES ABOUT 3/4" TO 1"
1/4" BOTTOM
FILLER PIECE
SIDE
FRONT
1 1/2"
1 3/8"
INLAY CUTS SAME AS ON TYPEWRITER DOOR
11/16"
MORTISE HINGE HOOKS INTO CENTER PIECE

FIG. 8 STATIONERY DRAWER DETAILS

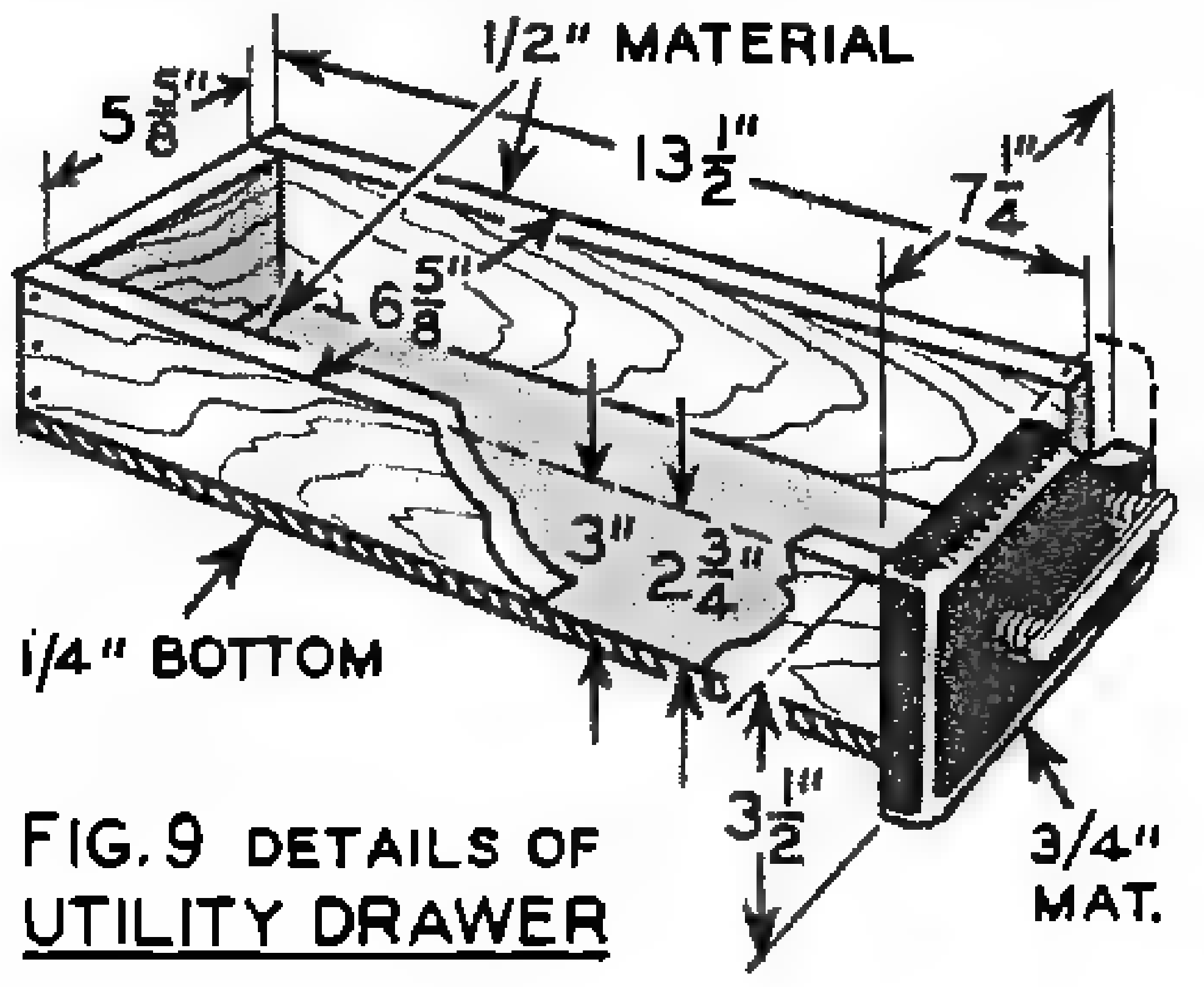

1/2" MATERIAL
5 5/8"
13 1/2"
7 1/4"
6 5/8"
3"
2 3/4"
1/4" BOTTOM
3 1/2"
3/4" MAT.

FIG. 9 DETAILS OF UTILITY DRAWER

In making paper and utility drawers too much care cannot be given to their construction. The utility drawer is shown at left. The swinging rod for paper drawer is detailed at right.

are still easy to get at and then the desk sides with a reminder at this point. Be sure to use your square and rule all the time while assembling so the job does not develop a twist. Putting on the file pocket bottoms will strengthen the job considerably. Follow with the file pocket fronts and the bottom strip. With this start you will easily work out the other details yourself.

It is advised that you do not build the supply section divisions into the desk. You might have your own ideas as to how you want to divide the space. Note the bevel on the top edge of the typewriter door as indicated in Figure 5. This is so that when you swing it up to serve as a copy holder it will lean back slightly. Make this angle to the degree you wish the board to lean. When the sliding typewriter drawer comes out, you have the necessary leg room. The drawer consists of the sides, which are fastened to the bottom and the back which fits to the bottom and between the sides. The typewriter is fastened to a separate typewriter board. This is the piece having two holes near the front

[*Continued on page* 122]

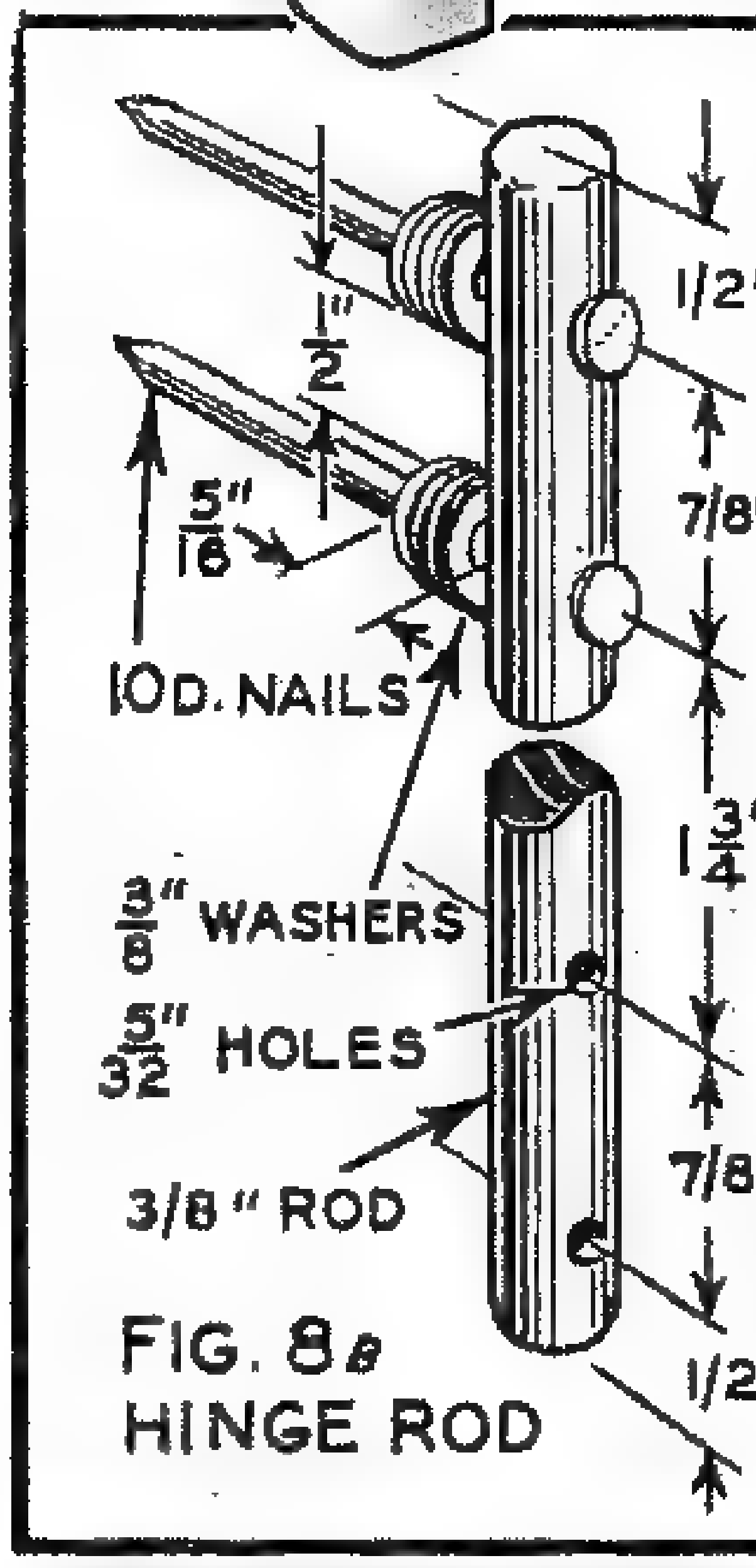

1/2"
1/2"
7/8"
5/16"
10D. NAILS
1 3/4"
3/8" WASHERS
5/32" HOLES
7/8"
3/8" ROD
1/2"

FIG. 8B HINGE ROD

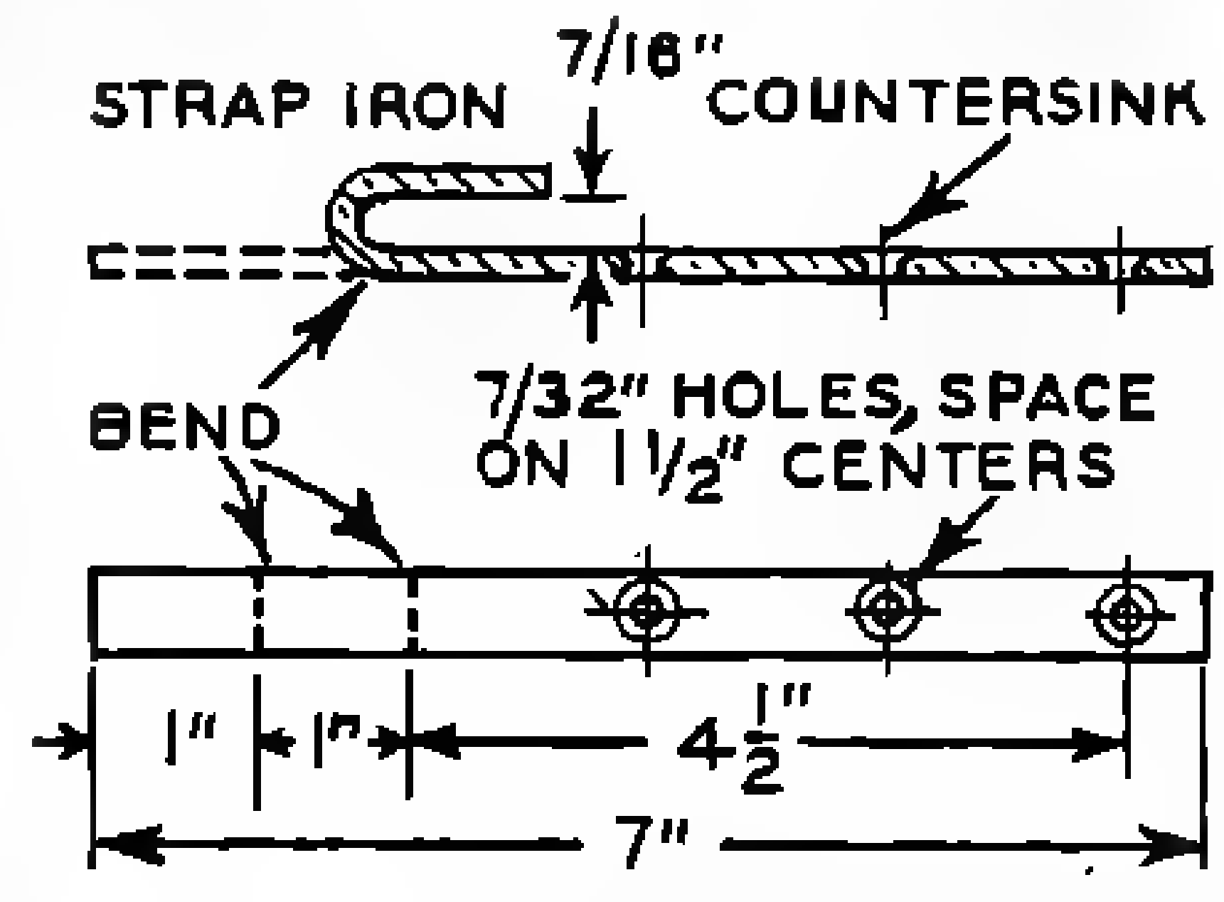

STRAP IRON
7/16"
COUNTERSINK
BEND
7/32" HOLES, SPACE ON 1 1/2" CENTERS
1"
1"
4 1/2"
7"

FIG. 8A DETAIL OF HINGE HOOK

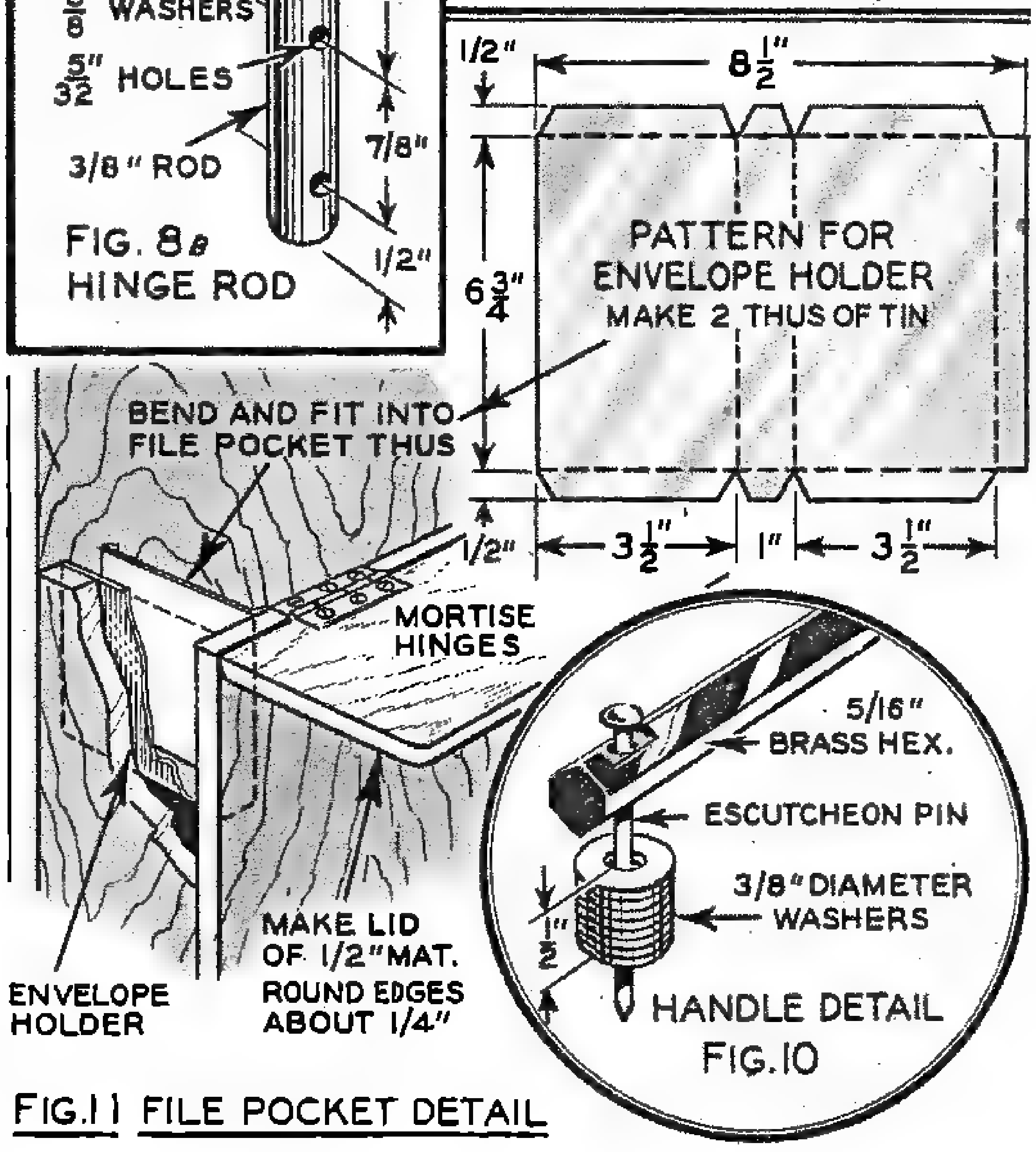
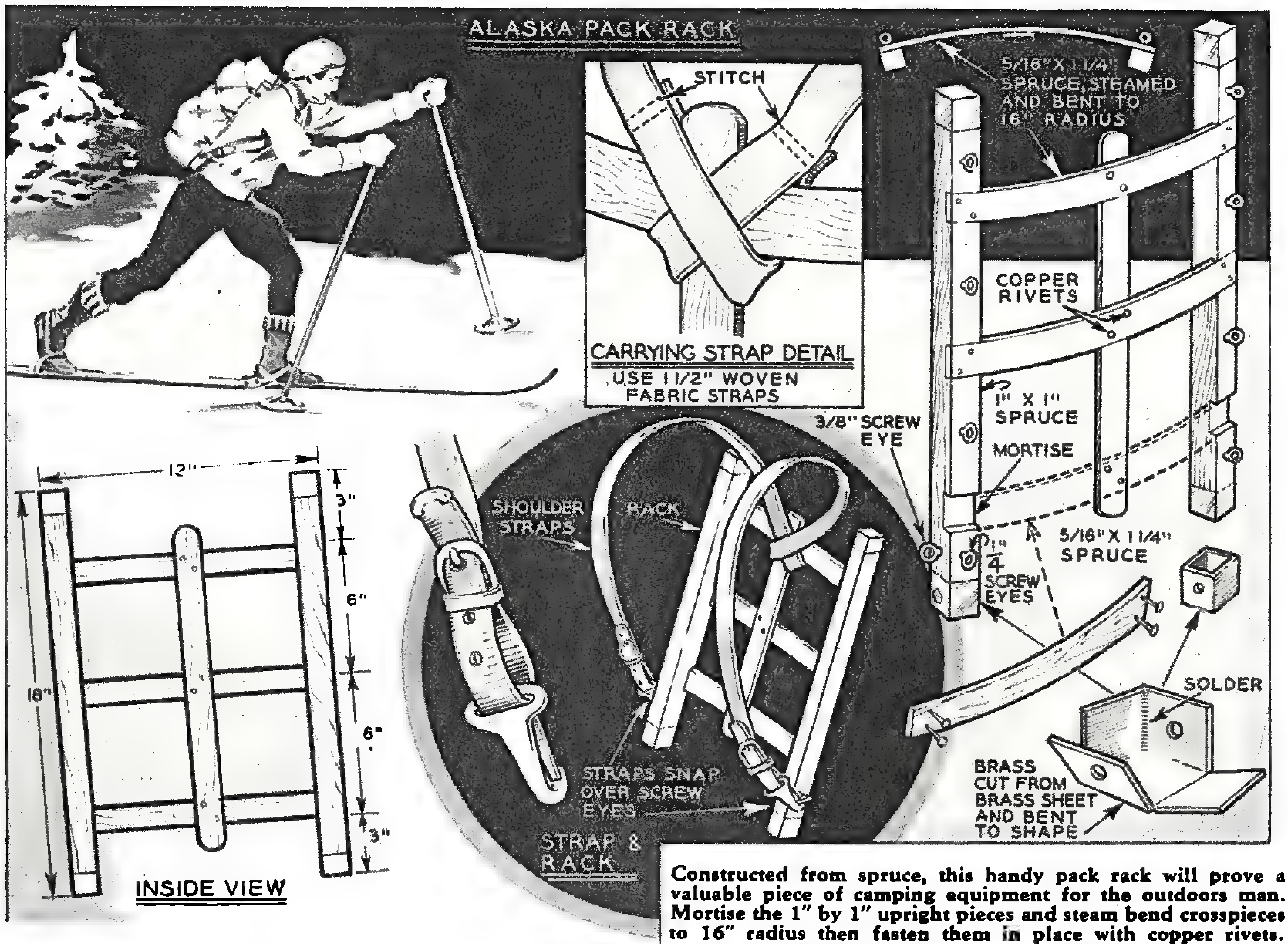

1/2"
8 1/2"
PATTERN FOR ENVELOPE HOLDER
MAKE 2 THUS OF TIN
6 3/4"
1/2"
3 1/2"
1"
3 1/2"
BEND AND FIT INTO FILE POCKET THUS
MORTISE HINGES
MAKE LID OF 1/2" MAT. ROUND EDGES ABOUT 1/4"
ENVELOPE HOLDER
5/16" BRASS HEX.
ESCUTCHEON PIN
3/8" DIAMETER WASHERS
1/2"
HANDLE DETAIL
FIG. 10

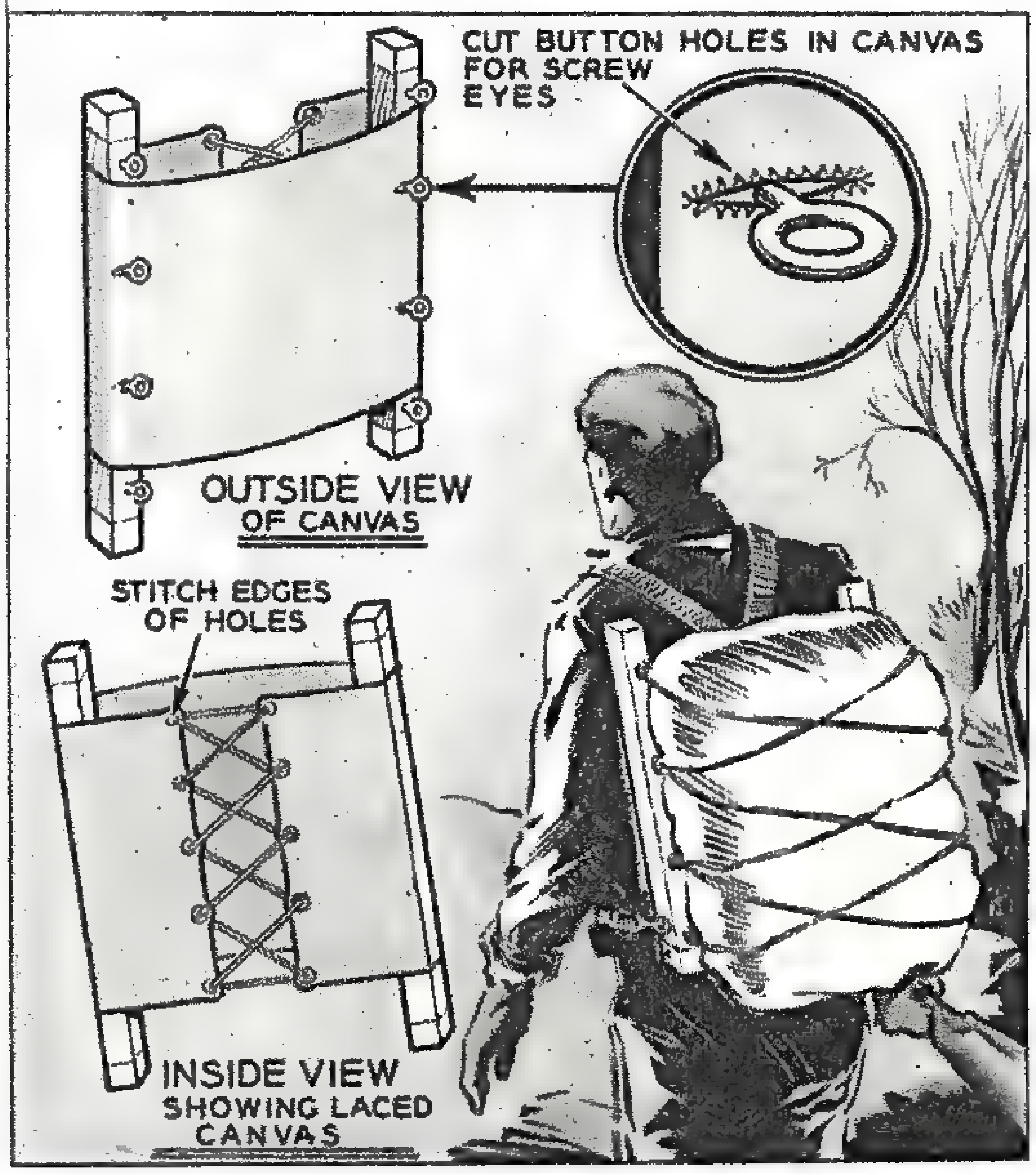
FIG. 11 FILE POCKET DETAIL

The drawer handles are cut from 5/16" brass rod and fastened in place with escutcheon pins. Use washers for handle stand-offs. The envelope holder is inserted in filing compartment.

Make a Sportsman's Pack Rack


ALASKA PACK RACK
STITCH
CARRYING STRAP DETAIL
USE 1 1/2" WOVEN FABRIC STRAPS
5/16" X 1 1/4" SPRUCE, STEAMED AND BENT TO 16" RADIUS
COPPER RIVETS
1" X 1" SPRUCE
MORTISE
3/8" SCREW EYE
1/4" SCREW EYES
5/16" X 1 1/4" SPRUCE
SOLDER
BRASS CUT FROM BRASS SHEET AND BENT TO SHAPE
SHOULDER STRAPS
RACK
STRAPS SNAP OVER SCREW EYES
STRAP & RACK
12"
3"
6"
6"
3"
18"
INSIDE VIEW

Constructed from spruce, this handy pack rack will prove a valuable piece of camping equipment for the outdoors man. Mortise the 1" by 1" upright pieces and steam bend crosspieces to 16" radius then fasten them in place with copper rivets.


CUT BUTTON HOLES IN CANVAS FOR SCREW EYES
OUTSIDE VIEW OF CANVAS
STITCH EDGES OF HOLES
INSIDE VIEW SHOWING LACED CANVAS

Screw-eyes mounted along the uprights permit the pack to be fastened firmly in place with leather thongs. To ease carrying, a canvas back is attached over frame and laced as shown.

THIS Alaskan-type pack rack will be found not only very practicable but easy to duplicate. It is constructed entirely of spruce and is exceptionally light with no sacrifice of strength.

Overall dimensions are given above. These are suitable for the average adult, but the individual had best build to his own size.

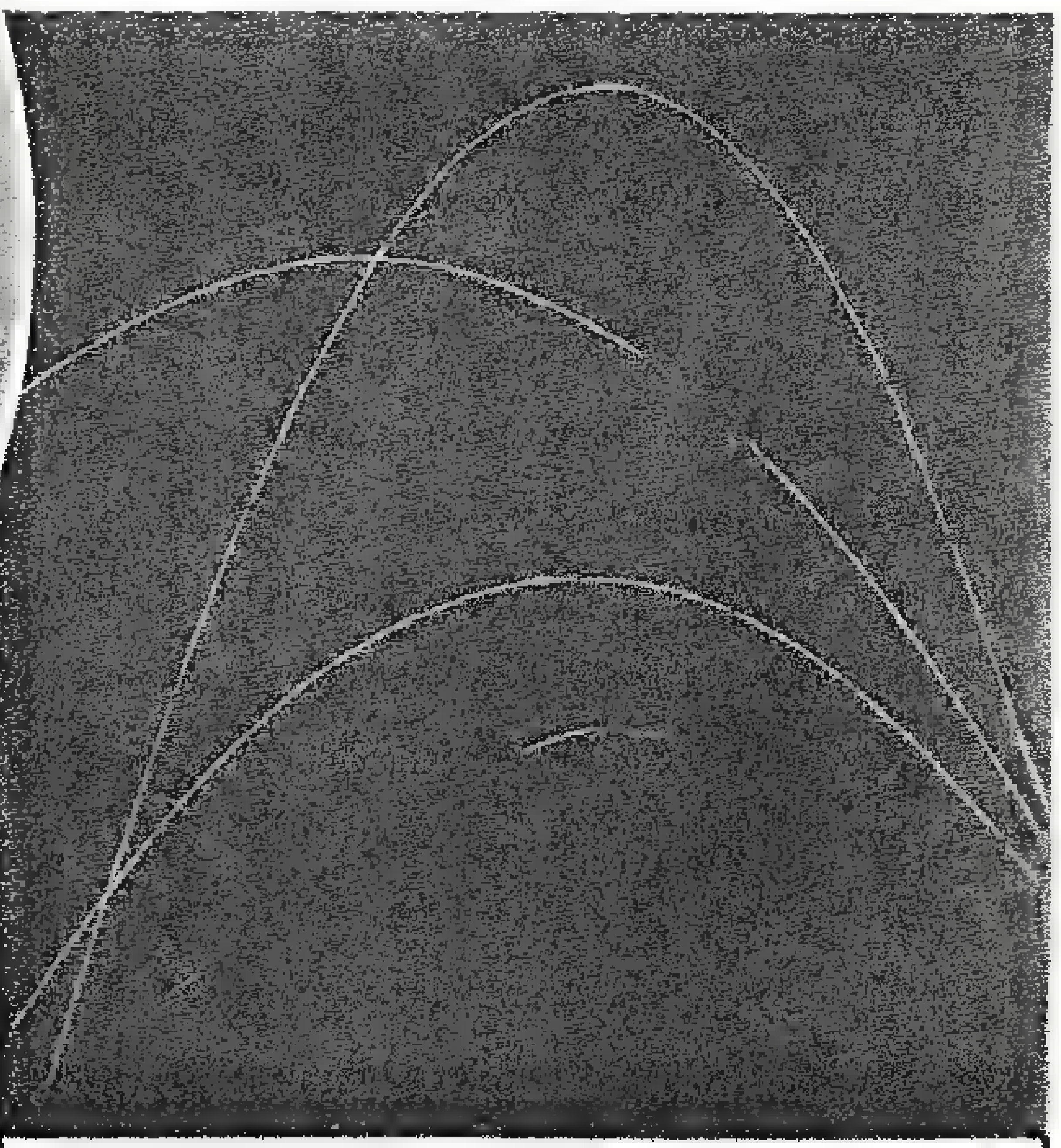
First make the side-members of 1 in. by 1 in. spruce or pine and cap the ends with brass. These caps can be cut from a single sheet, bent to form an open cube, soldered and screwed to the wood with roundhead brass screws. The curved cross-members are mortised in and secured with casein glue and galvanized nails or brass screws. They should be first soaked in boiling water, bent over a wooden form and not removed until thoroughly dry. The central upright is fastened with copper rivets. Screw-eyes of the sizes given are then put in. Two or three coats of shellac will prevent the rack from absorbing moisture.

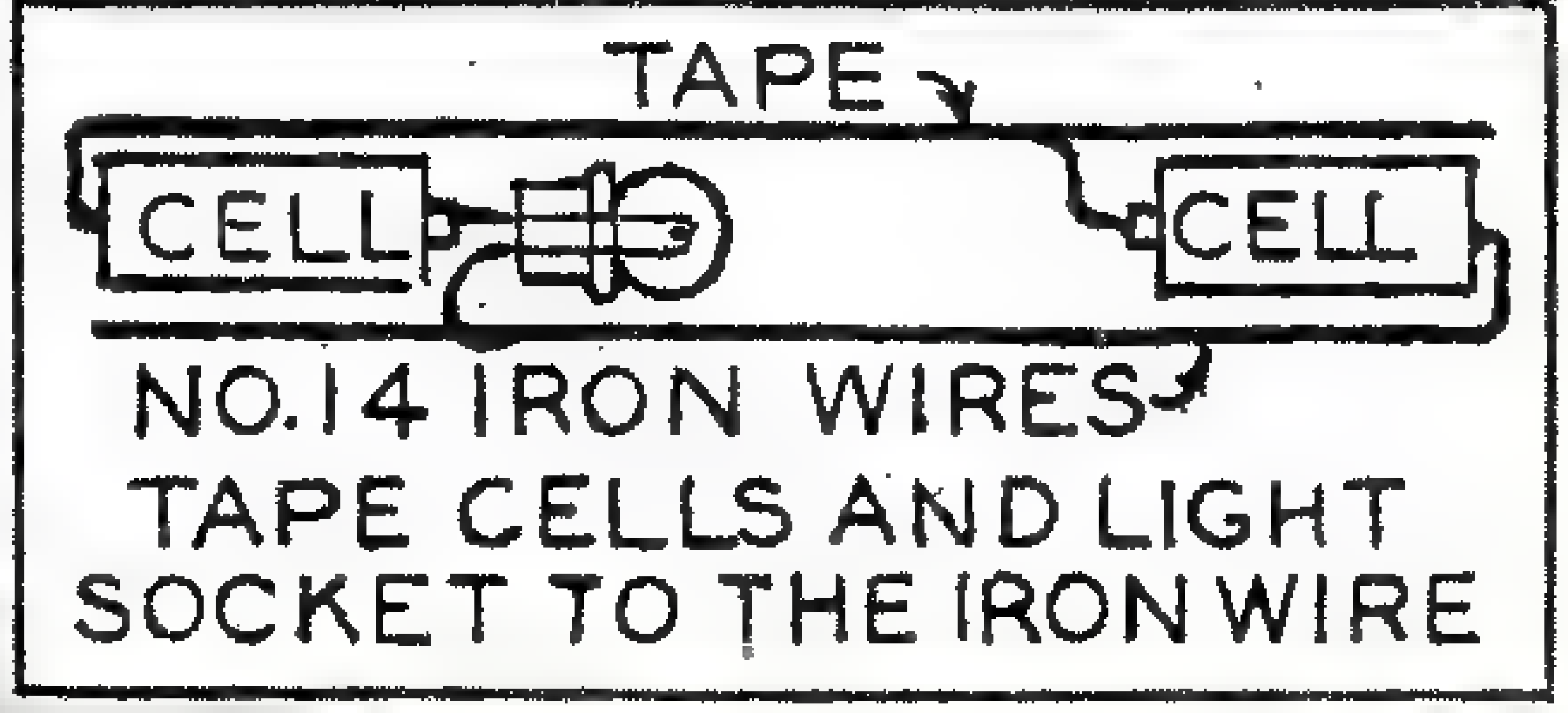
Canvas is then stretched over the frame

[*Continued on page* 122]

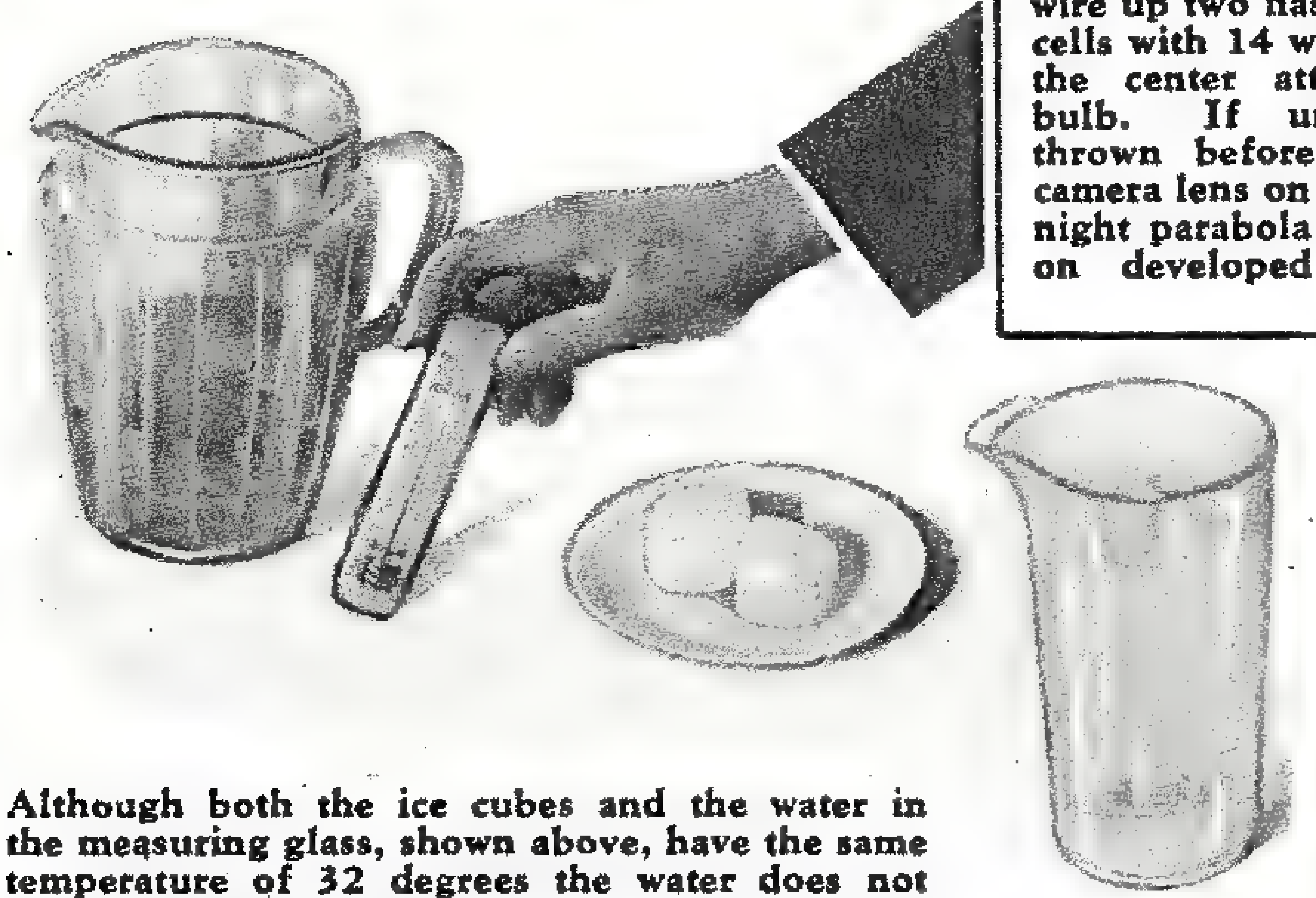
STRANGE ABOUT

Have you ever noticed that in the movies auto wheels turn backward? The camera shutter is responsible for this strange effect. Cut two cardboard discs; on one cut peep holes, on the other paint spokes. Attach discs to a handle and spin to see the effect.

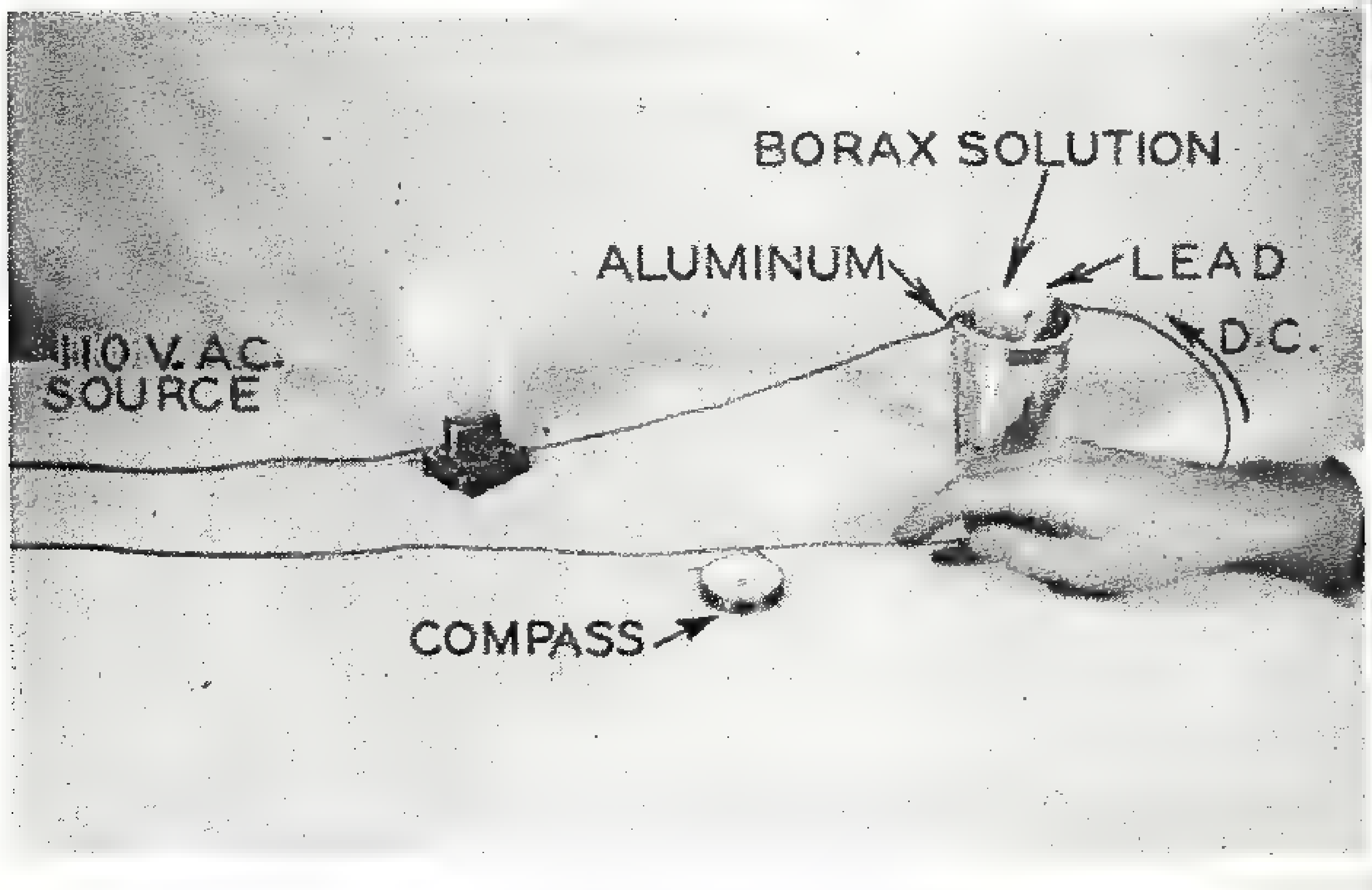




A ball when thrown always follows a parabola. To prove this wire up two flashlight cells with 14 wire. In the center attach a bulb. If unit is thrown before open camera lens on a dark night parabola shows on developed film.



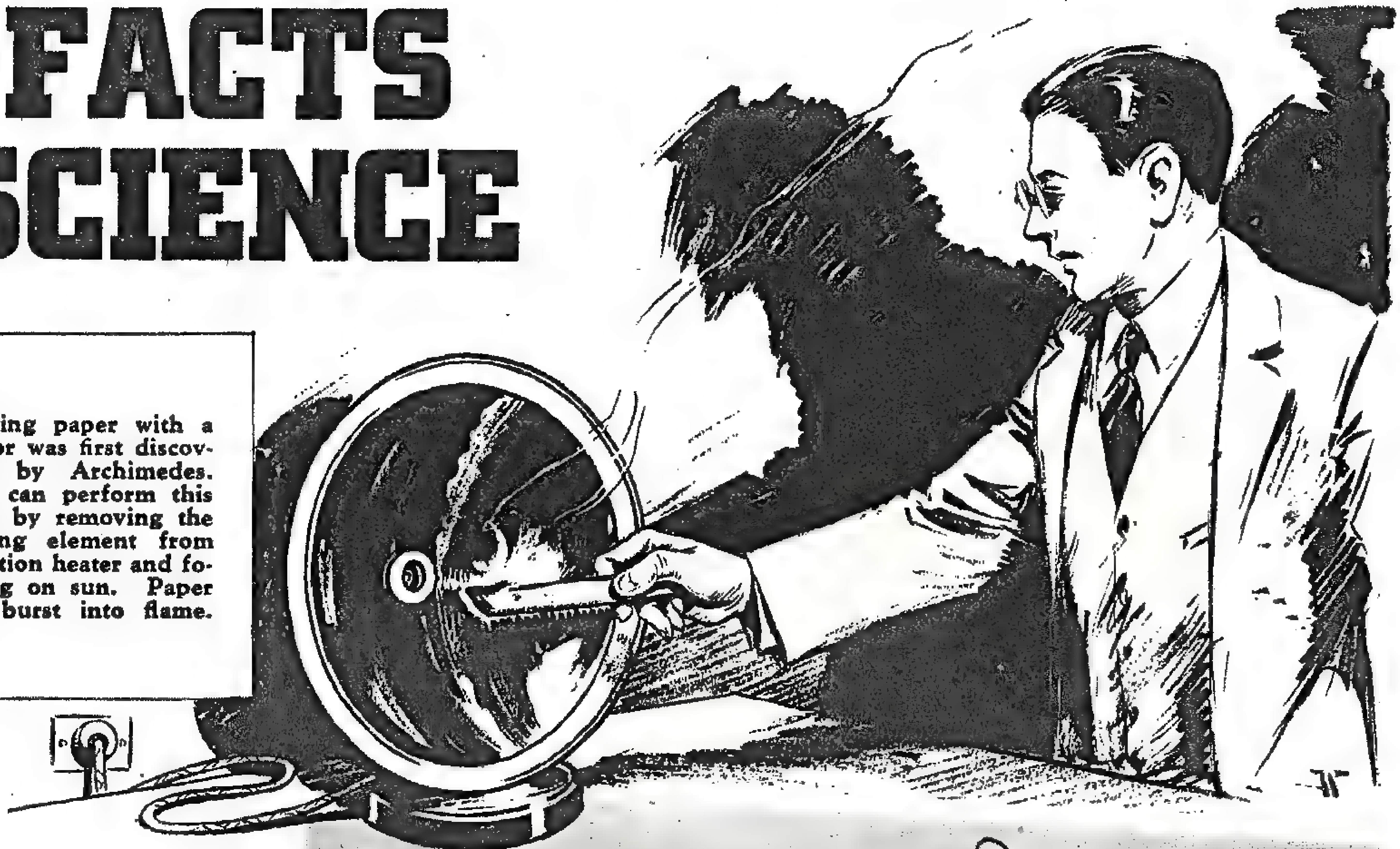
Although both the ice cubes and the water in the measuring glass, shown above, have the same temperature of 32 degrees the water does not have the cooling effect of the ice. Ice has greater cooling effect since it consumes more heat.



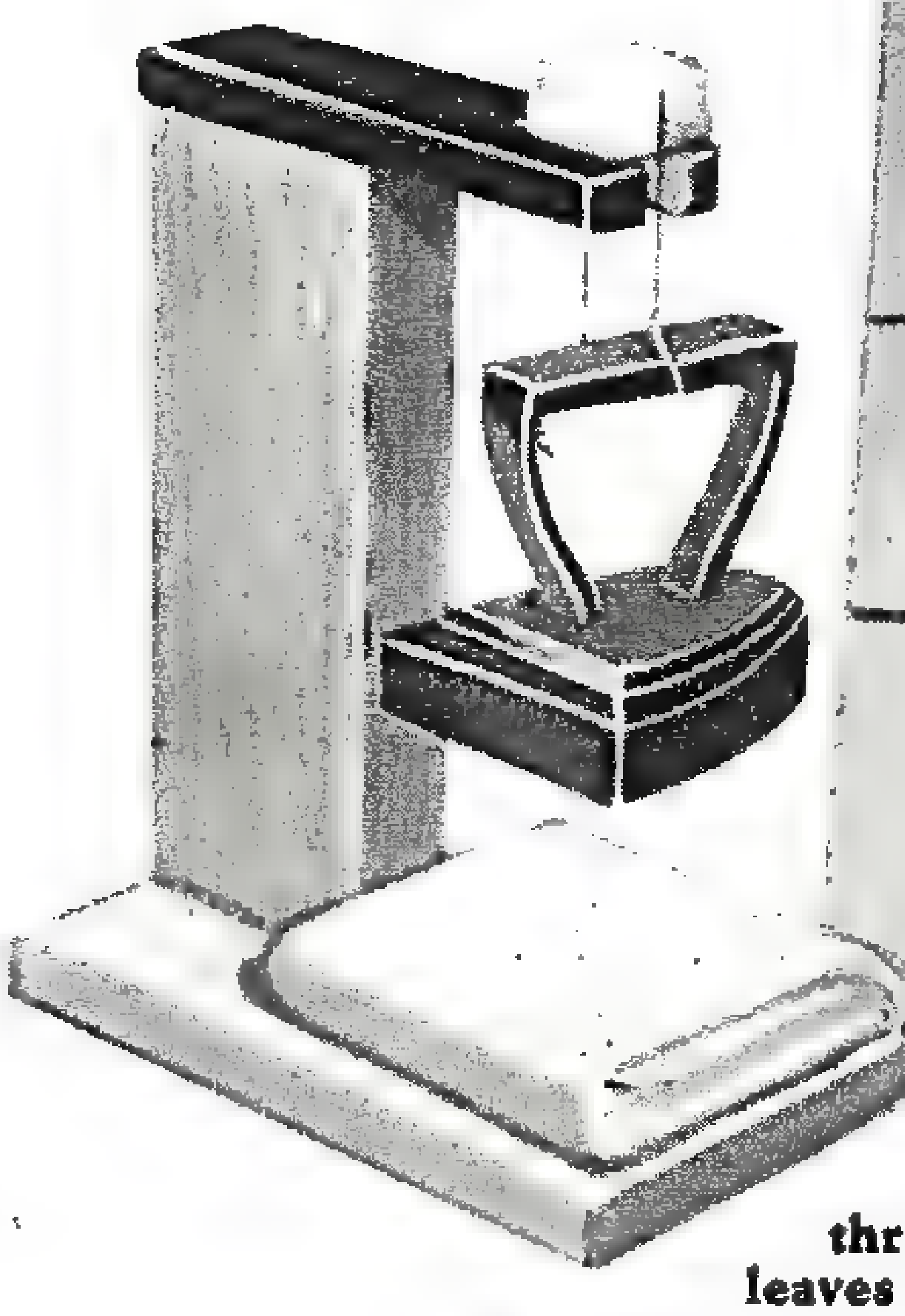
The method in which an alternating-to-direct current rectifier works is simply demonstrated with this apparatus. Connect an electric lamp in series with an aluminum and lead strip, placing within a borax solution. A compass brought near one of wires will show a deflection. On A. C. needle will not move.

Static electricity that will produce a bright spark can be generated with the above apparatus. A small tin lid is attached to a wooden handle with a small nail to form an "electrophorous." Rub a stick of sealing wax with flannel cloth then touch wax to the tin lid. Upon touching lid with a finger tip spark is produced.

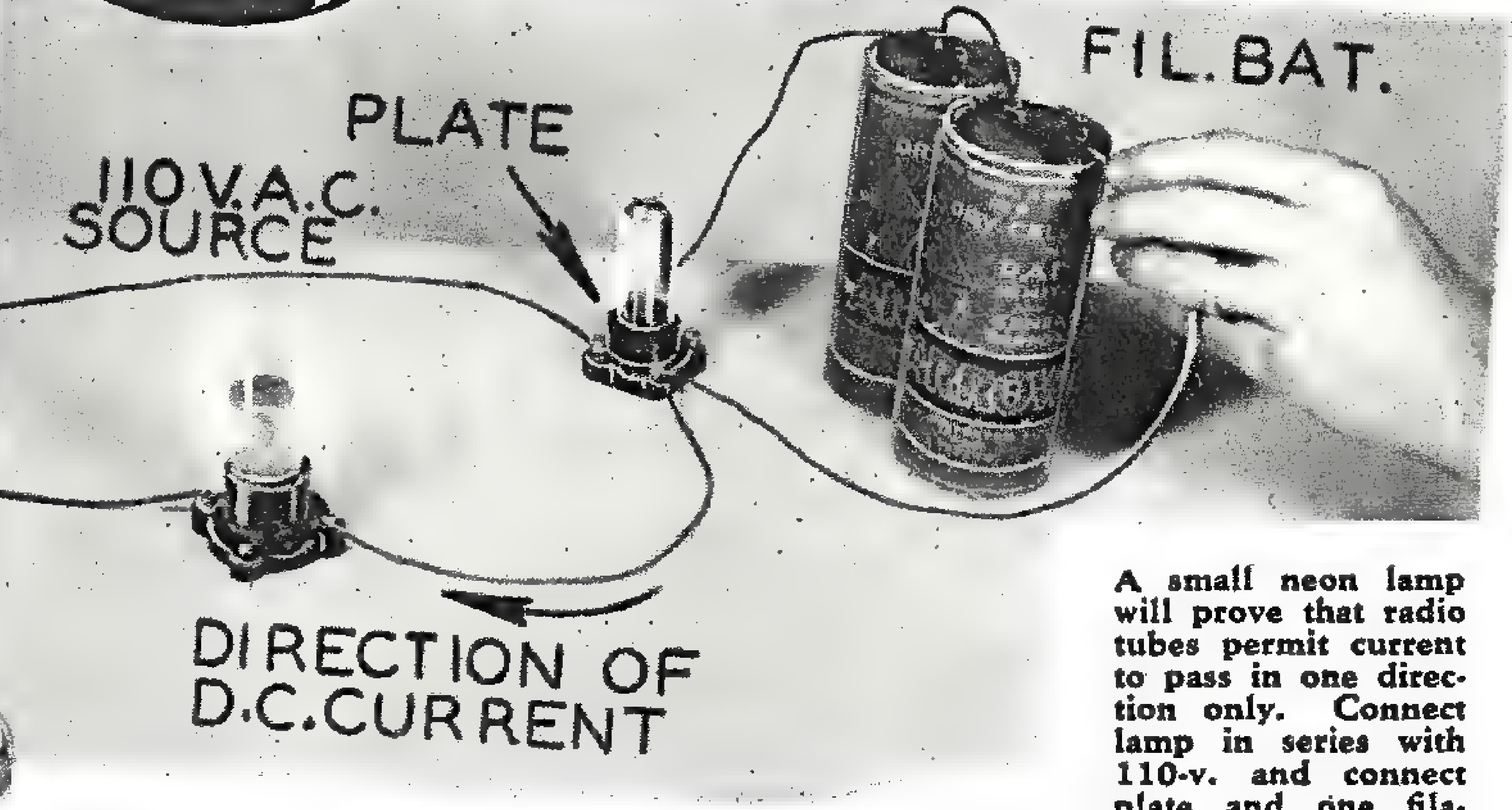
FACTS SCIENCE



Burning paper with a mirror was first discovered by Archimedes. You can perform this stunt by removing the heating element from radiation heater and fosusing on sun. Paper will burst into flame.



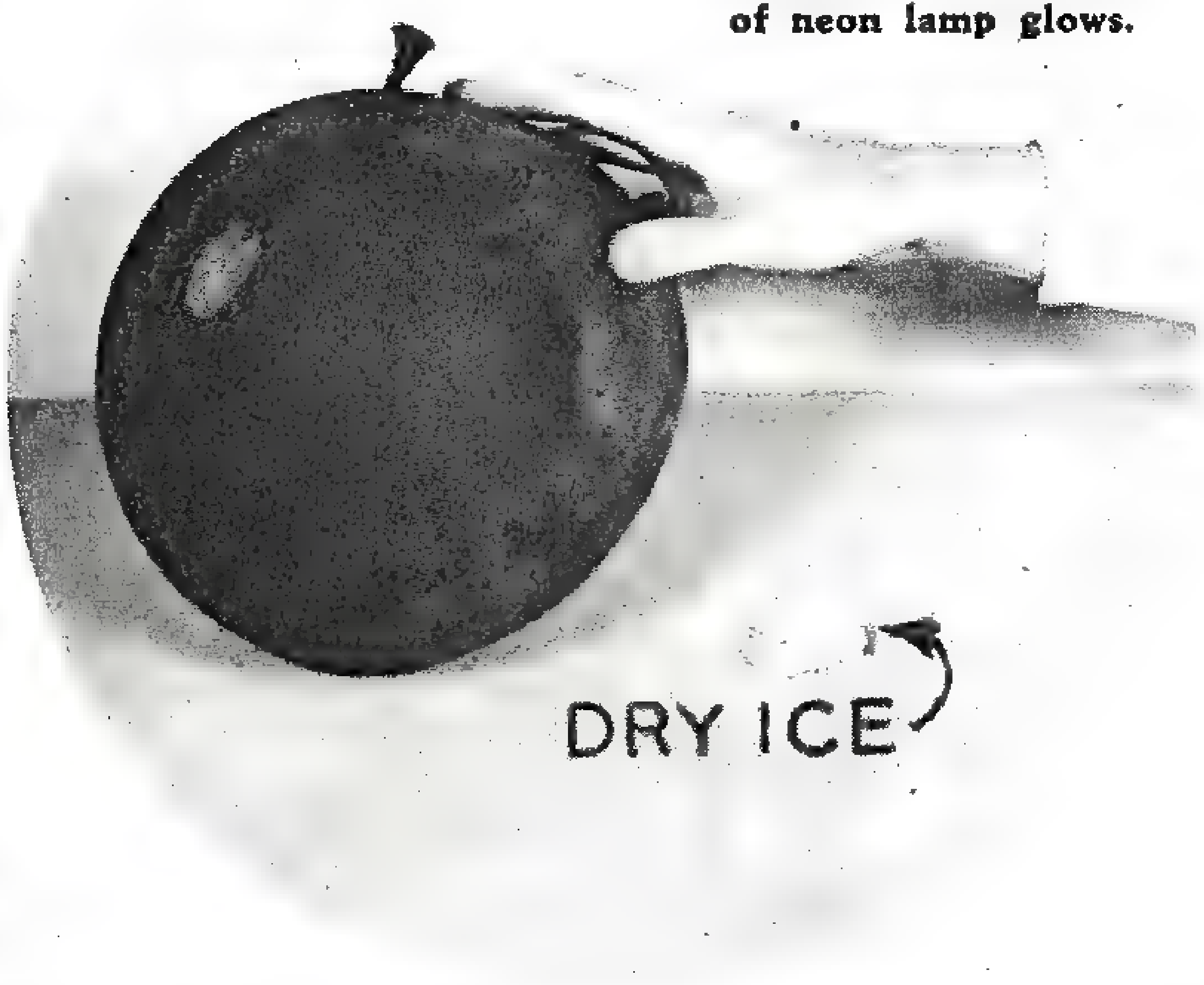
A wire passed completely through this ice cube still leaves it in one piece. As wire passes through, ice fuses together.



A small neon lamp will prove that radio tubes permit current to pass in one direction only. Connect lamp in series with 110-v. and connect plate and one filament to 110-v. also. When dry cells are connected to tube's filaments one plate of neon lamp glows.

THESE interesting scientific experiments can be performed without the use of expensive laboratory equipment to show the strange manner in which certain scientific principles act.

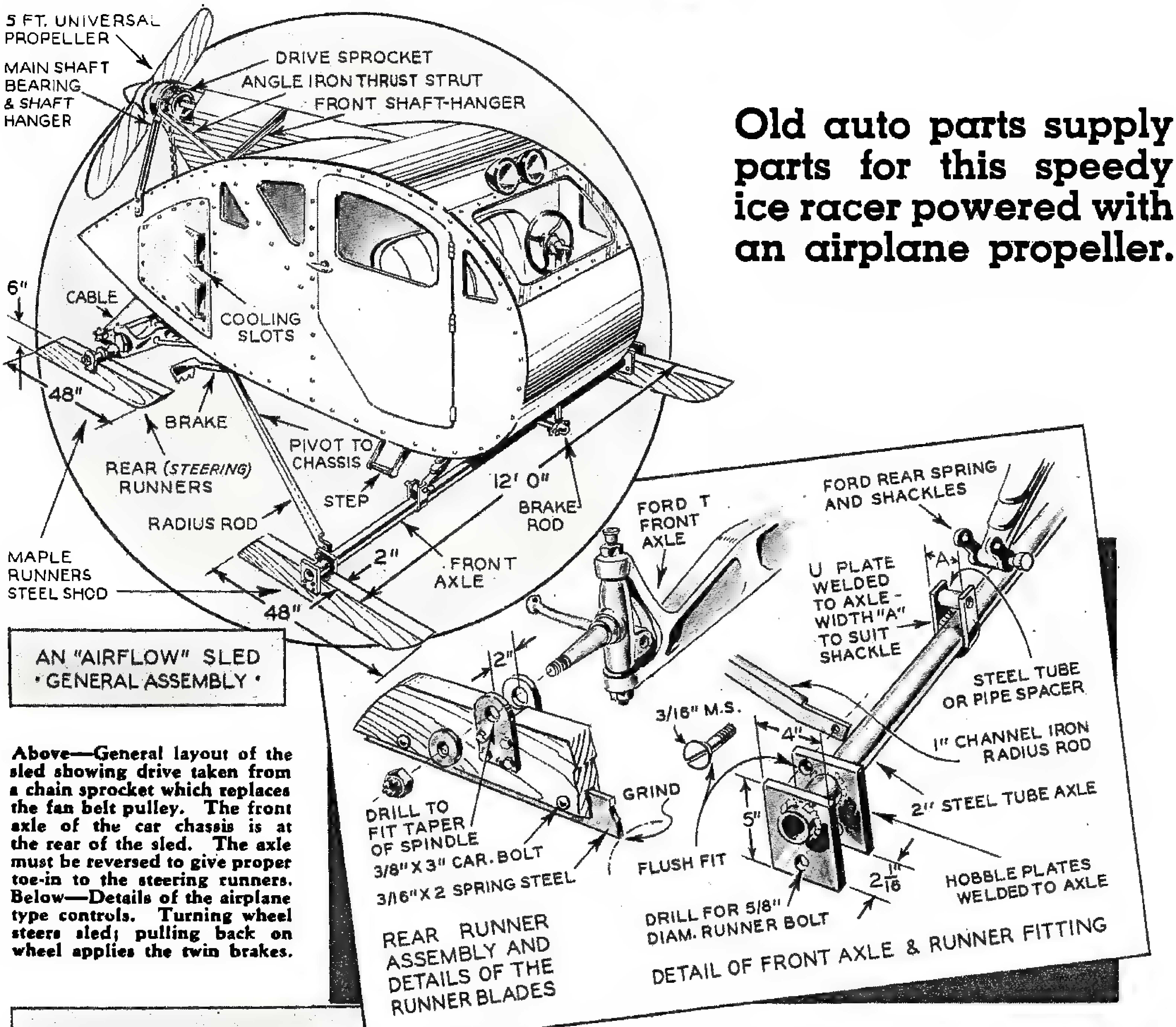
Dry ice sealed in a deflated toy balloon will cause it to blow up and burst, a piece of sealing wax can be made to produce static electricity, a neon electric bulb will show how a vacuum tube rectifier functions. These are only a few of the many stunts possible with the simple apparatus described here. Since most everyone is familiar with the theoretical explanations of these physics oddities only the method in which the stunts are performed are given. The experiments described here are simple enough even for those whose scientific knowledge is limited.



A toy balloon in which several pieces of dry ice have been placed will expand until it bursts if neck is closed. Stunt demonstrates how gas expands when changed from solid to vapor.

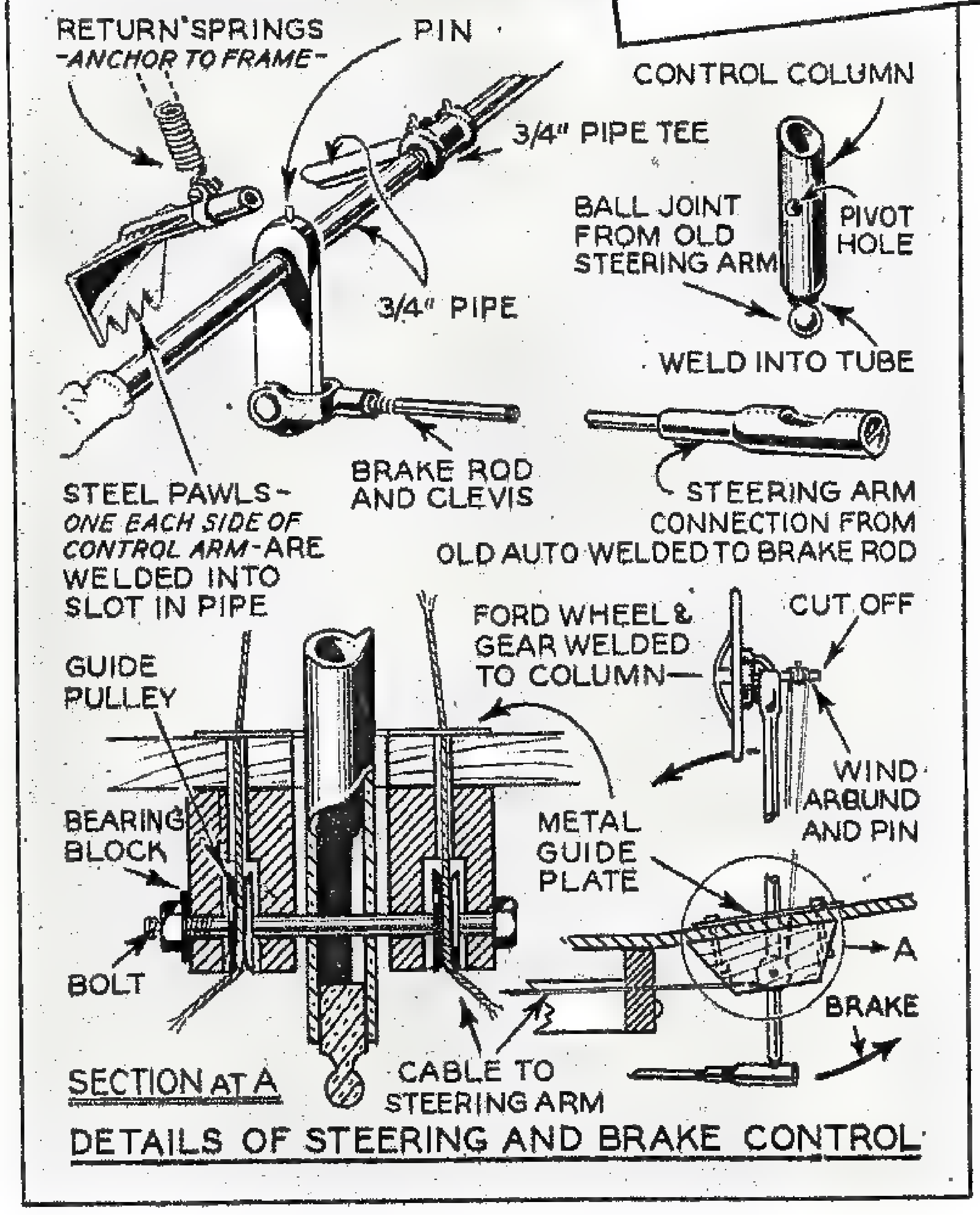
AIRPLANE THRILLS

Old auto parts supply parts for this speedy ice racer powered with an airplane propeller.


5 FT. UNIVERSAL PROPELLER
MAIN SHAFT BEARING & SHAFT HANGER
DRIVE SPROCKET
ANGLE IRON THRUST STRUT
FRONT SHAFT-HANGER
6"
CABLE
COOLING SLOTS
48"
BRAKE
REAR (STEERING) RUNNERS
PIVOT TO CHASSIS
STEP
12' 0"
BRAKE ROD
RADIUS ROD
2"
FRONT AXLE
MAPLE RUNNERS STEEL SHOD
48"
AN "AIRFLOW" SLED
• GENERAL ASSEMBLY •
FORD T FRONT AXLE
FORD REAR SPRING AND SHACKLES
U PLATE WELDED TO AXLE - WIDTH "A" TO SUIT SHACKLE
A
STEEL TUBE OR PIPE SPACER
1" CHANNEL IRON RADIUS ROD
2" STEEL TUBE AXLE
HOBBLE PLATES WELDED TO AXLE
2"
3/16" M.S.
4"
5"
GRIND
FLUSH FIT
2 1/16
DRILL TO FIT TAPER OF SPINDLE
3/8" X 3" CAR. BOLT
3/16" X 2 SPRING STEEL
DRILL FOR 5/8" DIAM. RUNNER BOLT
REAR RUNNER ASSEMBLY AND DETAILS OF THE RUNNER BLADES
DETAIL OF FRONT AXLE & RUNNER FITTING

Above—General layout of the sled showing drive taken from a chain sprocket which replaces the fan belt pulley. The front axle of the car chassis is at the rear of the sled. The axle must be reversed to give proper toe-in to the steering runners. Below—Details of the airplane type controls. Turning wheel steers sled; pulling back on wheel applies the twin brakes.

Any type of runner may be used. Type shown is shod with old auto spring steel leaf runners, hollow ground.

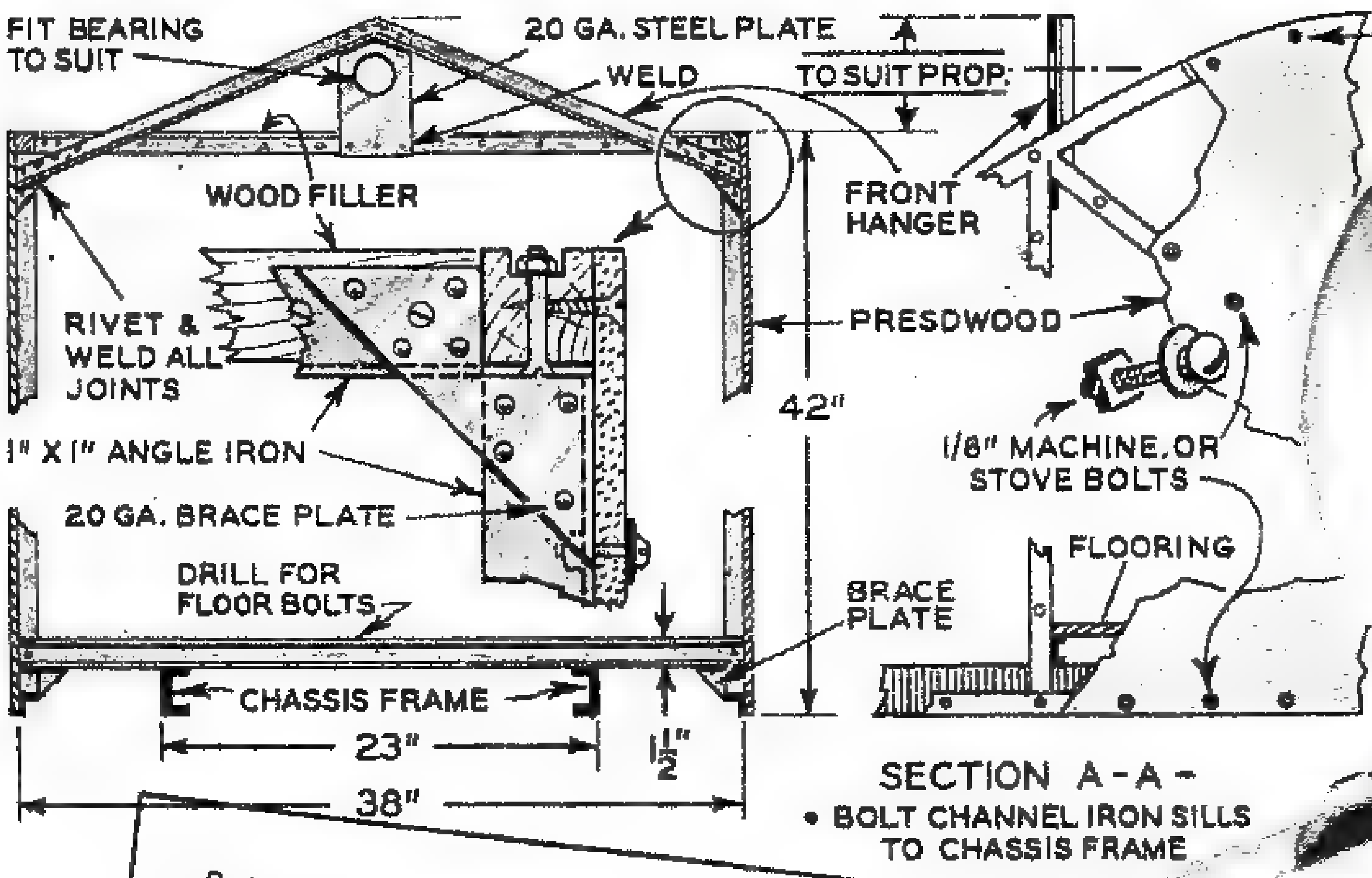

RETURN SPRINGS -ANCHOR TO FRAME-
PIN
CONTROL COLUMN
3/4" PIPE TEE
BALL JOINT FROM OLD STEERING ARM
PIVOT HOLE
3/4" PIPE
WELD INTO TUBE
STEEL PAWLS - ONE EACH SIDE OF CONTROL ARM - ARE WELDED INTO SLOT IN PIPE
BRAKE ROD AND CLEVIS
STEERING ARM CONNECTION FROM OLD AUTO WELDED TO BRAKE ROD
FORD WHEEL & GEAR WELDED TO COLUMN
CUT OFF
GUIDE PULLEY
WIND AROUND AND PIN
BEARING BLOCK
METAL GUIDE PLATE
A
BOLT
BRAKE
SECTION AT A
CABLE TO STEERING ARM
DETAILS OF STEERING AND BRAKE CONTROL

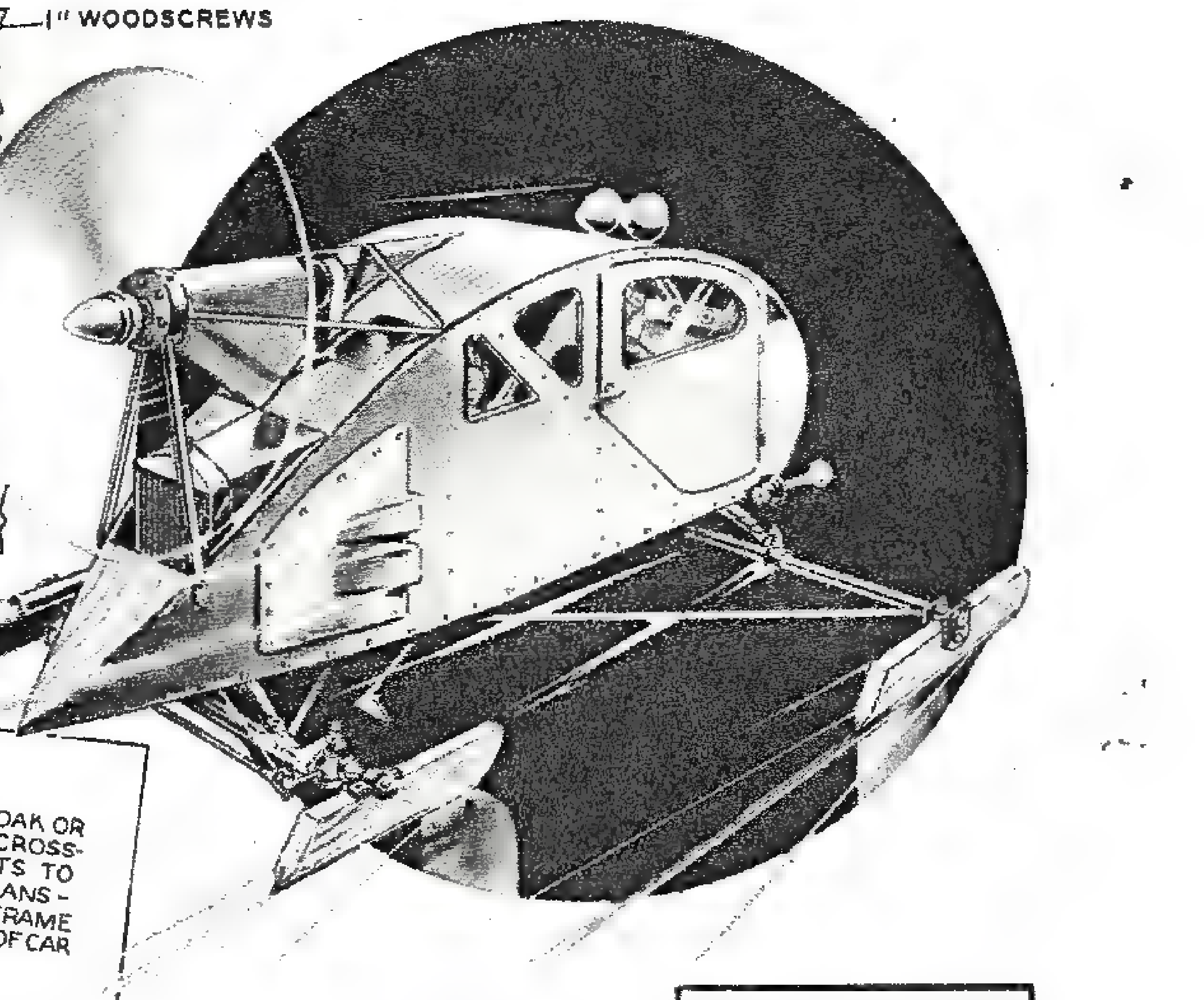
by Lieut. Douglas Rolfe

AS EVERYONE knows, the junk yards are literally stacked with old worn out cars. Cars with burned or battered bodies and broken wheels; cars with shot transmissions and useless brakes; cars in every imaginable form of disrepair. From among these disconsolate veterans resident in the local auto graveyard it will be possible to select one, preferably a light car, which has the prime requisites for converting it into a trim aero driven ice plane.

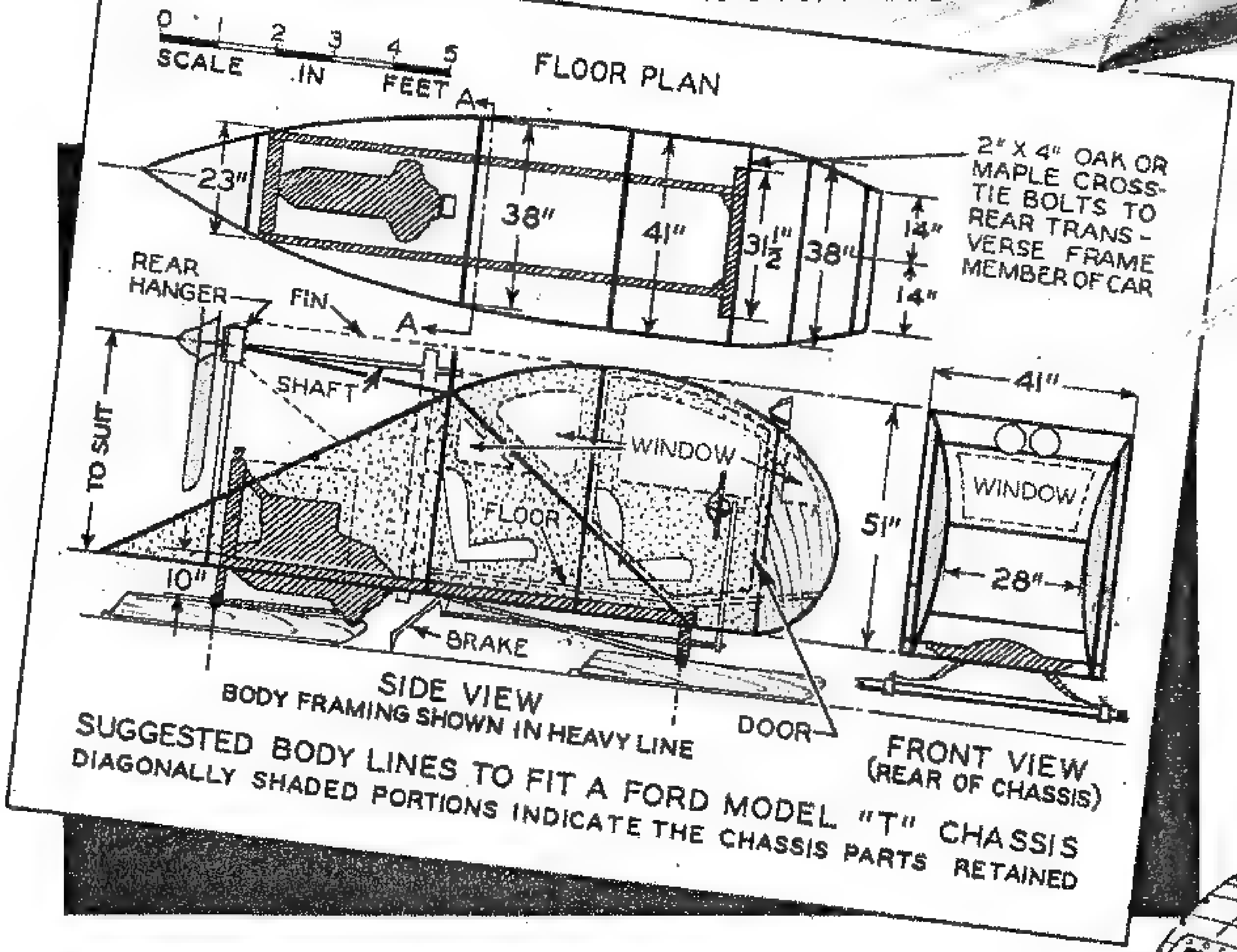
The requirements are as few as they are simple. First, a sound and unwarped chassis. Secondly, a motor which even if not exactly in good condition is yet able to run. Unless a motor is too hopelessly worn out a little

WITH "AIRFLOW" ICE SLED

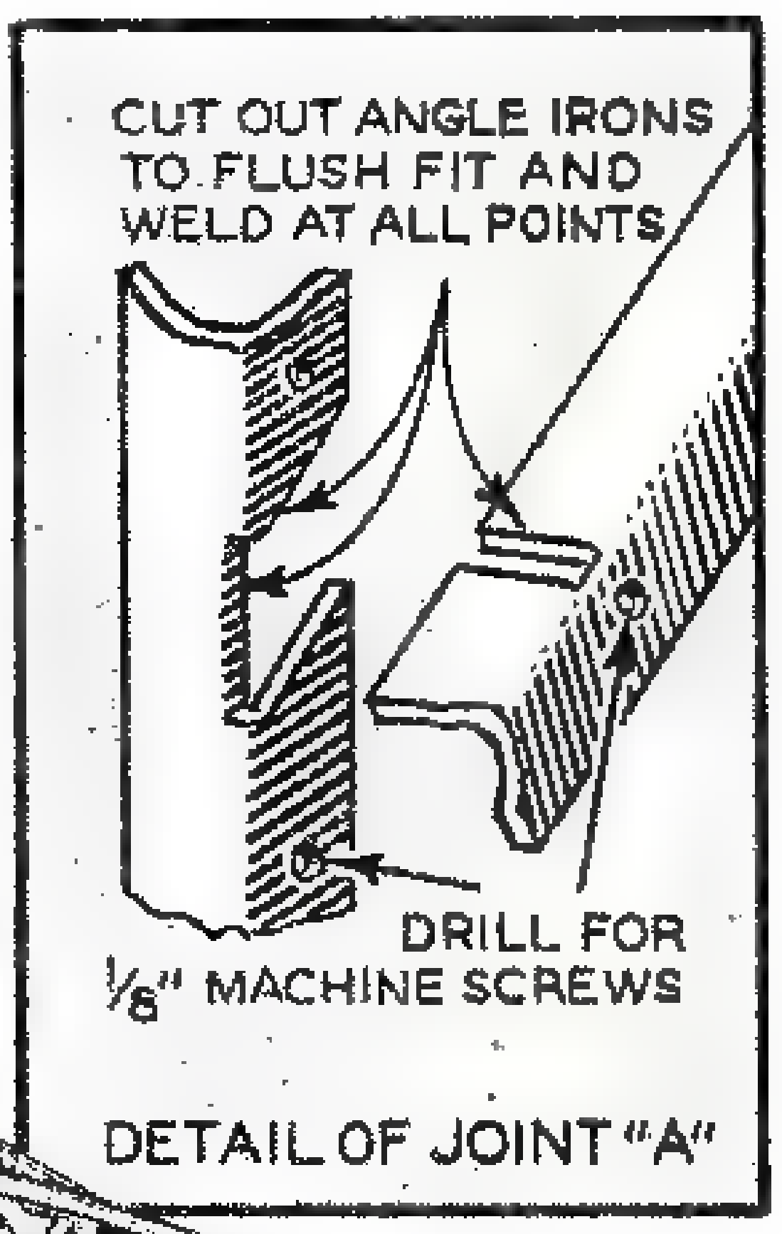

FIT BEARING TO SUIT
20 GA. STEEL PLATE
WELD
TO SUIT PROP.
1" WOODSCREWS
WOOD FILLER
FRONT HANGER
RIVET & WELD ALL JOINTS
PRESDWOOD
42"
1" X 1" ANGLE IRON
1/8" MACHINE, OR STOVE BOLTS
20 GA. BRACE PLATE
FLOORING
DRILL FOR FLOOR BOLTS
BRACE PLATE
CHASSIS FRAME
23"
1½"
38"
SECTION A-A-
• BOLT CHANNEL IRON SILLS TO CHASSIS FRAME



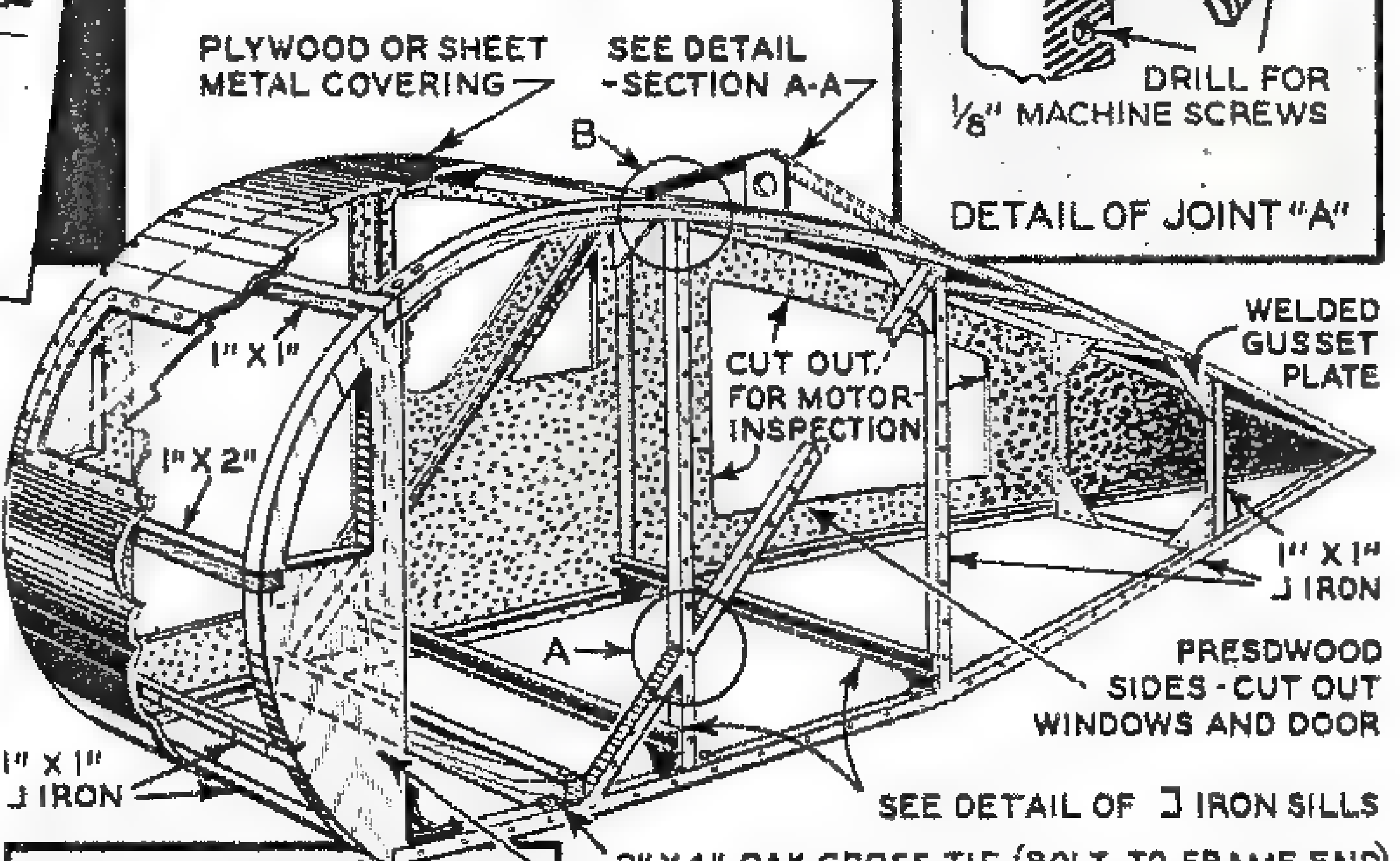
Above—View of the suggested sled showing drive taken from a belt pulley fitted behind the transmission housing. Details of drive pulleys, shaft hanger and rear bearing are similar to those used for "Polar Queen", described in the 1936 *How to Build It.*


0 1 2 3 4 5
SCALE IN FEET
FLOOR PLAN
A
23"
38"
41"
31½"
38"
14"
14"
2" X 4" OAK OR MAPLE CROSS-TIE BOLTS TO REAR TRANSVERSE FRAME MEMBER OF CAR
REAR HANGER
FIN
A
SHAFT
TO SUIT
WINDOW
FLOOR
10"
BRAKE
41"
WINDOW
51"
28"
SIDE VIEW
BODY FRAMING SHOWN IN HEAVY LINE
DOOR
FRONT VIEW
(REAR OF CHASSIS)

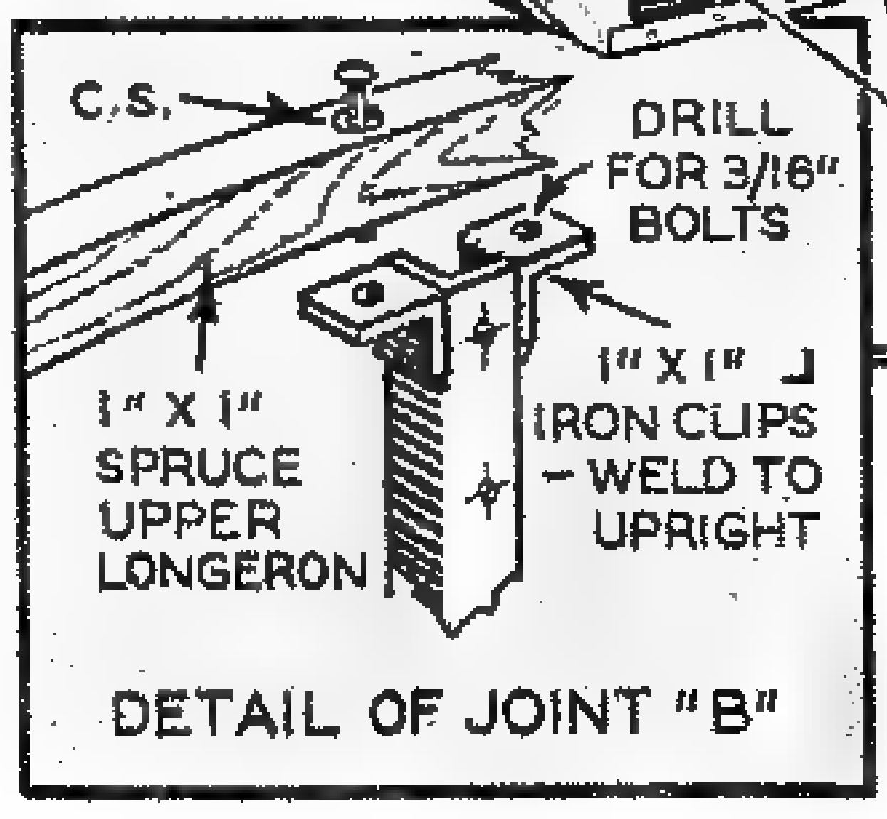
SUGGESTED BODY LINES TO FIT A FORD MODEL "T" CHASSIS
DIAGONALLY SHADED PORTIONS INDICATE THE CHASSIS PARTS RETAINED


CUT OUT ANGLE IRONS TO FLUSH FIT AND WELD AT ALL POINTS
DRILL FOR 1/8" MACHINE SCREWS

DETAIL OF JOINT "A"


PLYWOOD OR SHEET METAL COVERING
SEE DETAIL -SECTION A-A
B
WELDED GUSSET PLATE
1" X 1"
1" X 2"
CUT OUT FOR MOTOR INSPECTION
1" X 1" IRON
PRESDWOOD SIDES - CUT OUT WINDOWS AND DOOR
A
1" X 1" IRON
SEE DETAIL OF IRON SILLS
2" X 4" OAK CROSS TIE (BOLT TO FRAME END)
3/4" 5-PLY FIR NOSE FORMER SECURED TO FRAME BY BRACKETS

—BODY—FRAMING


C.S.
DRILL FOR 3/16" BOLTS
1" X 1" IRON CLIPS - WELD TO UPRIGHT
1" X 1" SPRUCE UPPER LONGERON

DETAIL OF JOINT "B"

The body frame is constructed of angle iron and wood and is mounted to the car frame by the channel iron sills as shown in Section A-A, top left detail drawing.

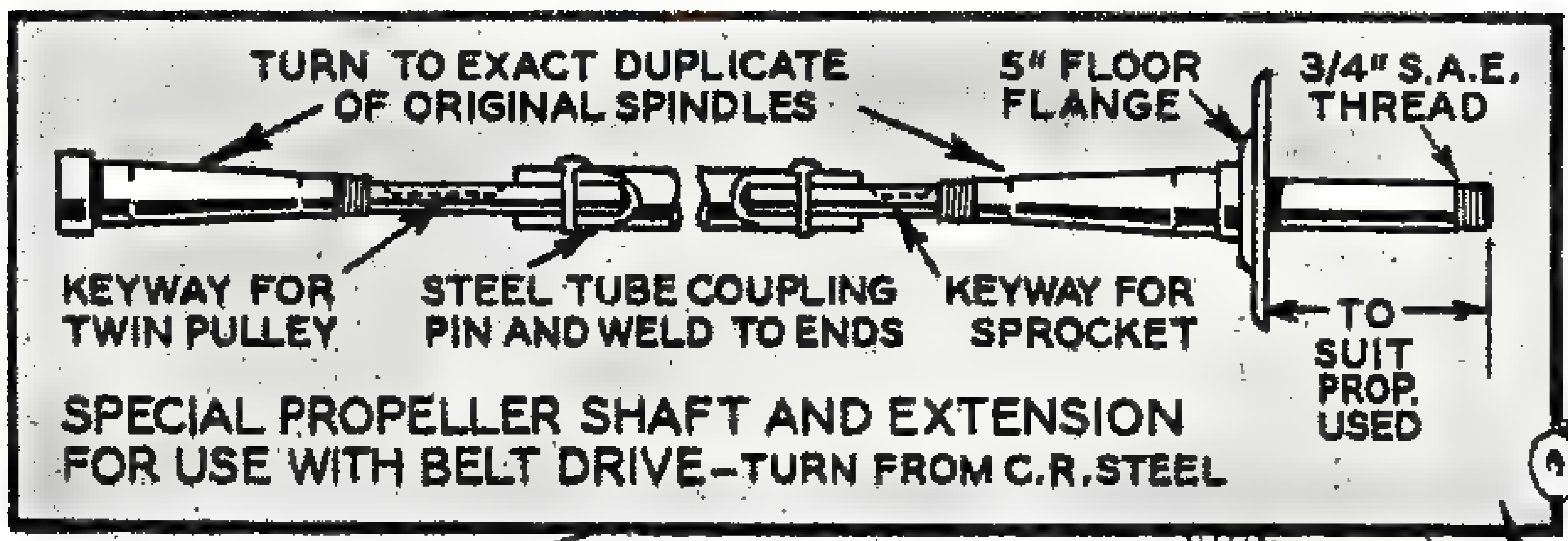
patience and some judicial overhauling will result in a quite satisfactory power plant for the purpose intended.

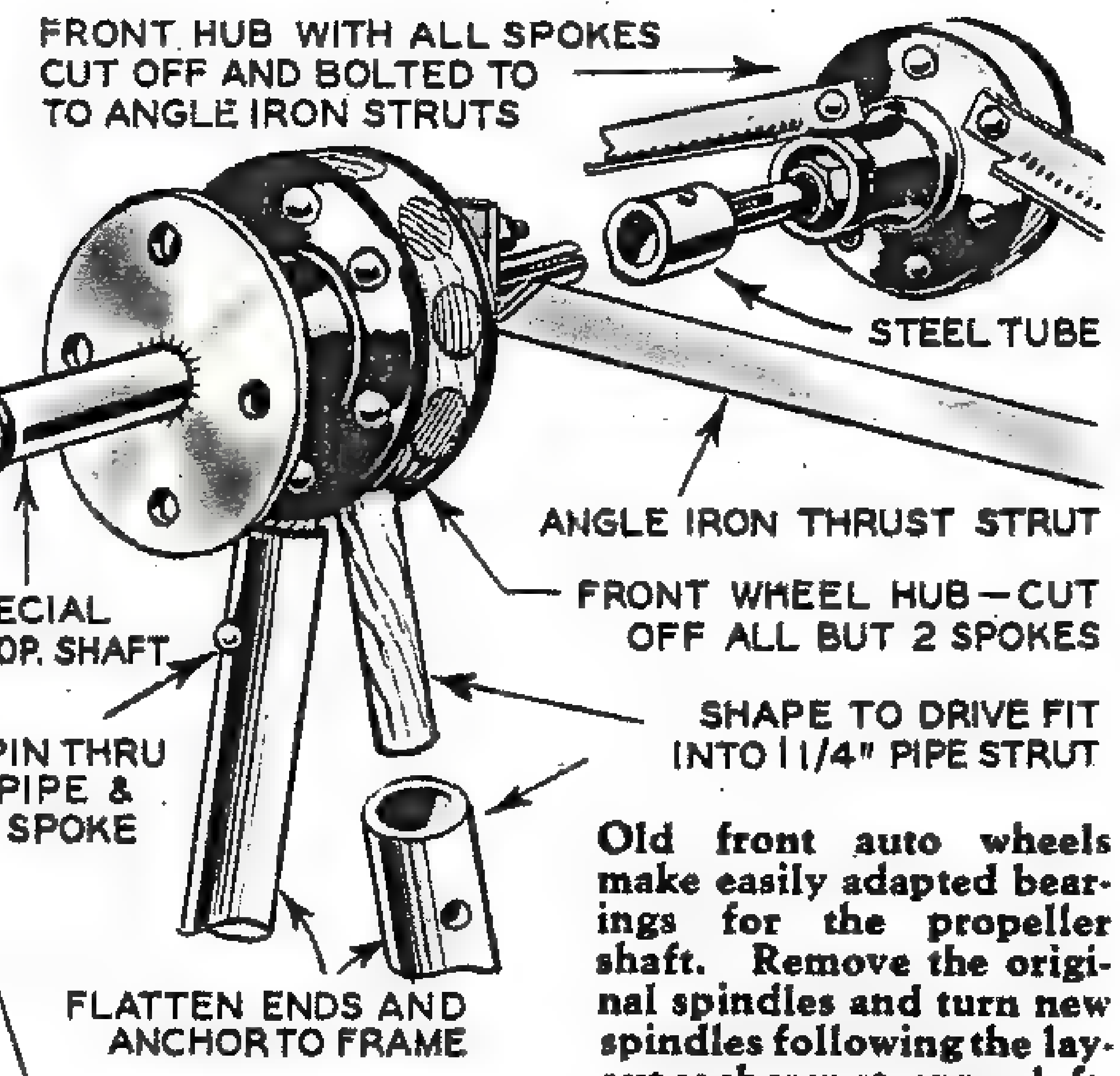
Assuming that you have picked out a car having these two essential factors you can start dickering with the owner. There are a good many parts you won't need at all so bear this in mind when making the deal. For instance: The body, fenders, the entire transmission, back axle and rear wheels are entirely unnecessary for your plans and are only so much extra junk for you to cart away. By leaving them on the spot you will undoubtedly be able to strike a better bargain.

The front wheels and the steering wheel are needed for purposes we shall presently discover and you will also want the starter; in fact, all the parts pertaining to the operation of the motor itself. The battery is likely to be missing or at best useless so you can make up your mind that here is one item that will have to be included in the moderate amount of new material the conversion requires.

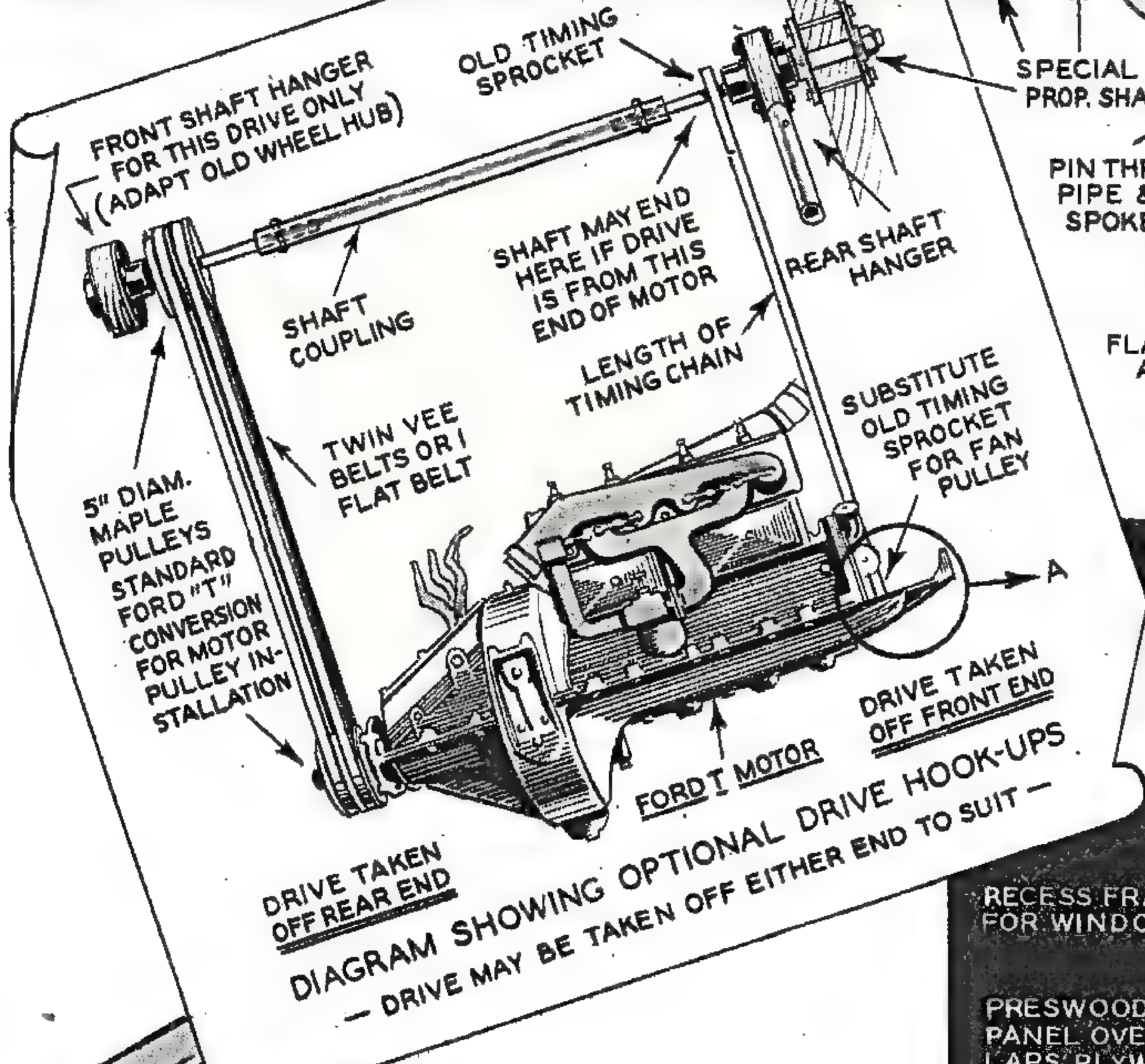
Strip the car down to the bare chassis unless you have already bought it in this condition. If the motor seems to need some tinkering, now is the time to do it. A good top overhaul will work wonders with any motor so get this little job off your mind and satisfy yourself that the motor is in reasonably good working condition before proceeding with the actual conversion.

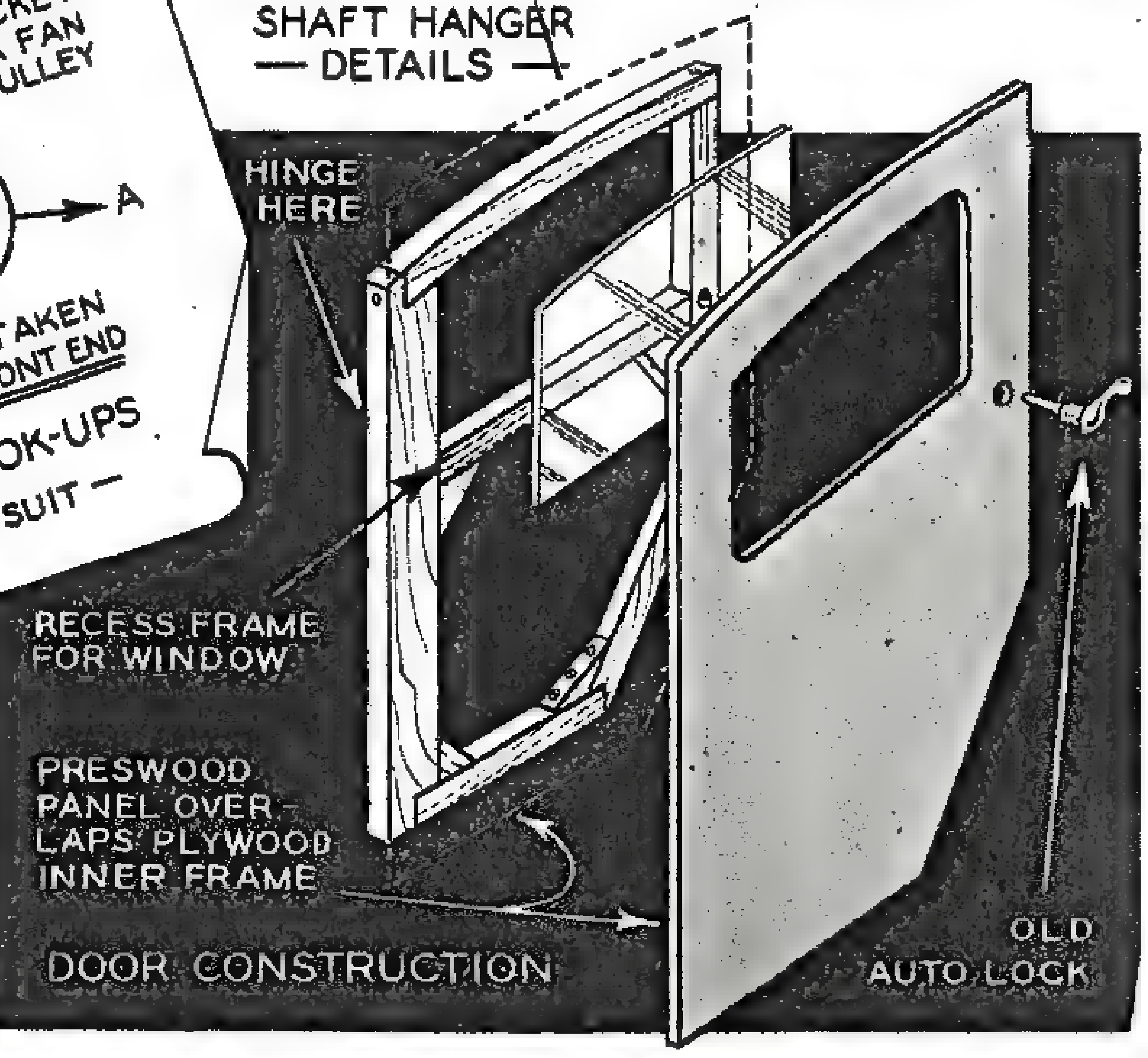
With the motor in shape remove all wiring from the dash board and the steering gear as far as the steering tie rod which is left intact.

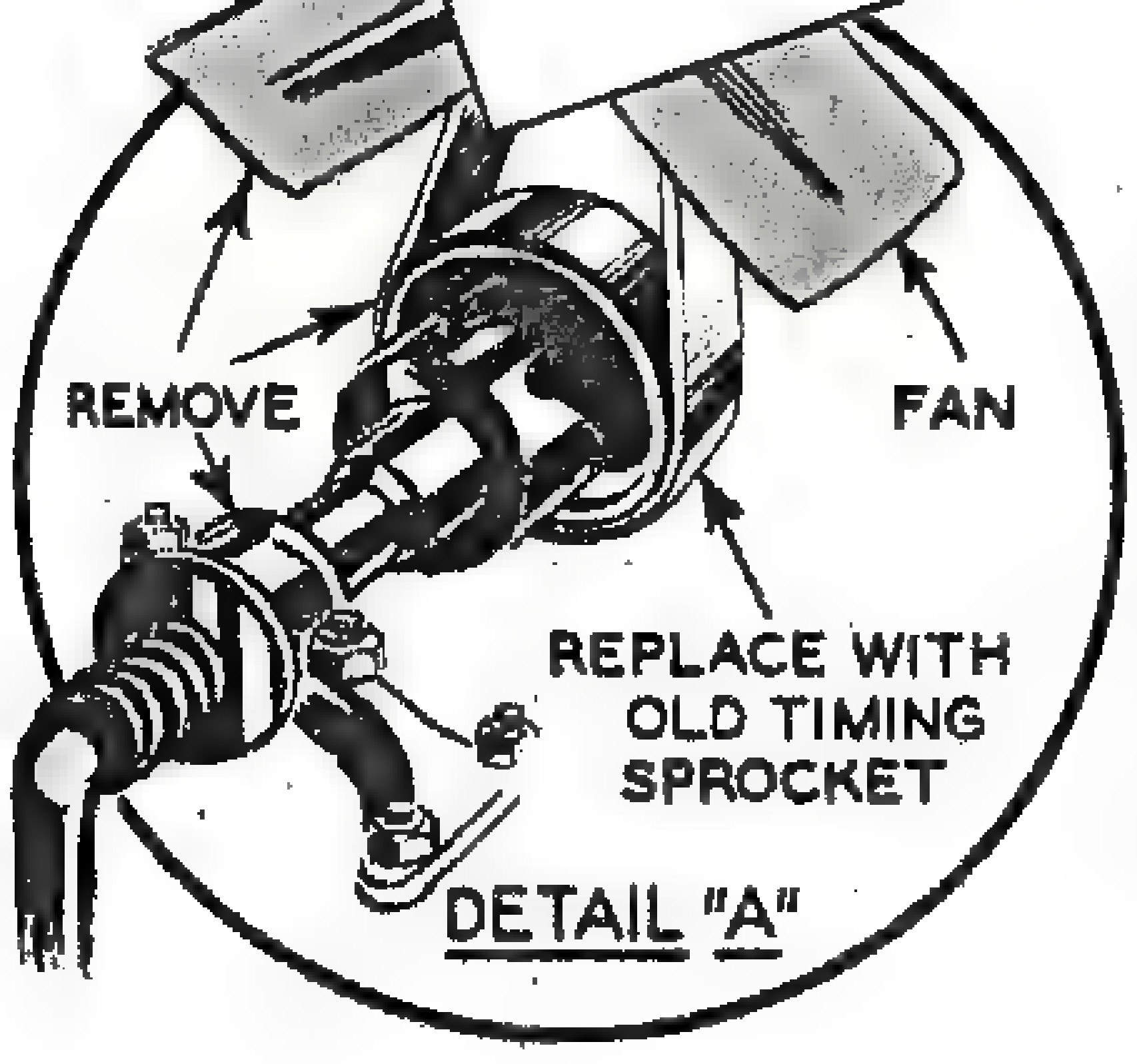

TURN TO EXACT DUPLICATE OF ORIGINAL SPINDLES
5" FLOOR FLANGE
3/4" S.A.E. THREAD
KEYWAY FOR TWIN PULLEY
STEEL TUBE COUPLING PIN AND WELD TO ENDS
KEYWAY FOR SPROCKET
TO SUIT PROP. USED
SPECIAL PROPELLER SHAFT AND EXTENSION FOR USE WITH BELT DRIVE–TURN FROM C.R. STEEL


FRONT HUB WITH ALL SPOKES CUT OFF AND BOLTED TO TO ANGLE IRON STRUTS
STEEL TUBE
ANGLE IRON THRUST STRUT
SPECIAL PROP. SHAFT
FRONT WHEEL HUB—CUT OFF ALL BUT 2 SPOKES
SHAPE TO DRIVE FIT INTO 1 1/4" PIPE STRUT
PIN THRU PIPE & SPOKE
FLATTEN ENDS AND ANCHOR TO FRAME
SHAFT HANGER — DETAILS

Old front auto wheels make easily adapted bearings for the propeller shaft. Remove the original spindles and turn new spindles following the layout as shown at upper left.


FRONT SHAFT HANGER FOR THIS DRIVE ONLY (ADAPT OLD WHEEL HUB)
OLD TIMING SPROCKET
SHAFT COUPLING
SHAFT MAY END HERE IF DRIVE IS FROM THIS END OF MOTOR
REAR SHAFT HANGER
LENGTH OF TIMING CHAIN
TWIN VEE BELTS OR 1 FLAT BELT
SUBSTITUTE OLD TIMING SPROCKET FOR FAN PULLEY
A
5" DIAM. MAPLE PULLEYS STANDARD FORD "T" CONVERSION FOR MOTOR PULLEY INSTALLATION
DRIVE TAKEN OFF FRONT END
FORD T MOTOR
DRIVE TAKEN OFF REAR END
DIAGRAM SHOWING OPTIONAL DRIVE HOOK-UPS
— DRIVE MAY BE TAKEN OFF EITHER END TO SUIT —


HINGE HERE
RECESS FRAME FOR WINDOW
PRESWOOD PANEL OVERLAPS PLYWOOD INNER FRAME
DOOR CONSTRUCTION
OLD AUTO LOCK


REMOVE
FAN
REPLACE WITH OLD TIMING SPROCKET
DETAIL "A"

The drive can be taken off either end of the motor. Belt drive is less positive, but more suited for long drives such as this. Solid maple pulleys cut with twin grooves for the Vee belting should be used and an idler pulley will be found helpful in taking up any slack that develops in the belt. At right—Method suggested for building the doors.

Also any odds and ends which appear to be unwanted. The radiator should be checked for possible leaks and left intact.

The next procedure is to manufacture the runners. Unless you have acquired something other than a light car the runners described on the opposite page will be satisfactory regardless of the exact make of the car. The runners are of simple straightforward construction, of ample strength and present no difficulties.

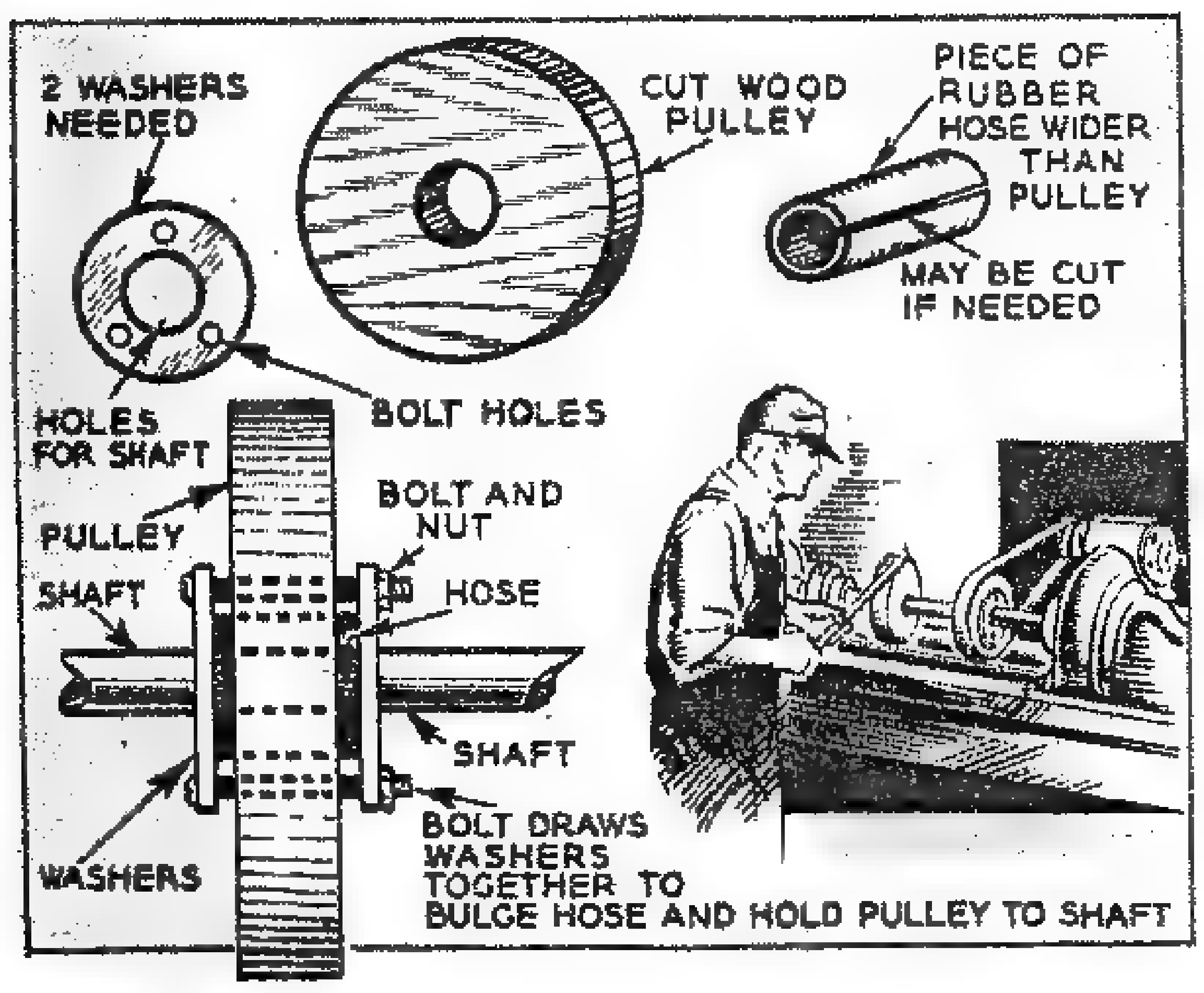
The rear runners are hobbled to the front axle spindles and form the steering mechanism of the sled. The front runners are hobbled to a length of steel tubing which is bolted to the late rear springs, thus supplanting the old rear axle and now becoming the front axle or spreader bar. Before attaching the runners it is a good plan to remove as many leaves as seem desirable from the spring assemblies. The number of leaves removed depends largely upon the type of car and also the number of seats you plan to provide in the completed sled. Traveling as you will be, on comparatively smooth ice, there is no necessity for such spring strength as road travel demands, but don't remove *too* many leaves out unless you wish to progress in a series of undulating leaps with the attendant sensation of riding upon a broken down mattress. A certain amount of stiffness or rigidity is not only desirable—it is essential.

You will observe from the drawings that in fitting the tubular front axle considerably more track has been allowed the front runners than the rear, or steering runners. The reason for this wider track is to avoid all possible chance of the plane's tipping.

The new steering arrangements are nicely illustrated in the detailed diagrams. As will

[*Continued on page* 132]

SHORT-CUTS FOR HANDY MEN

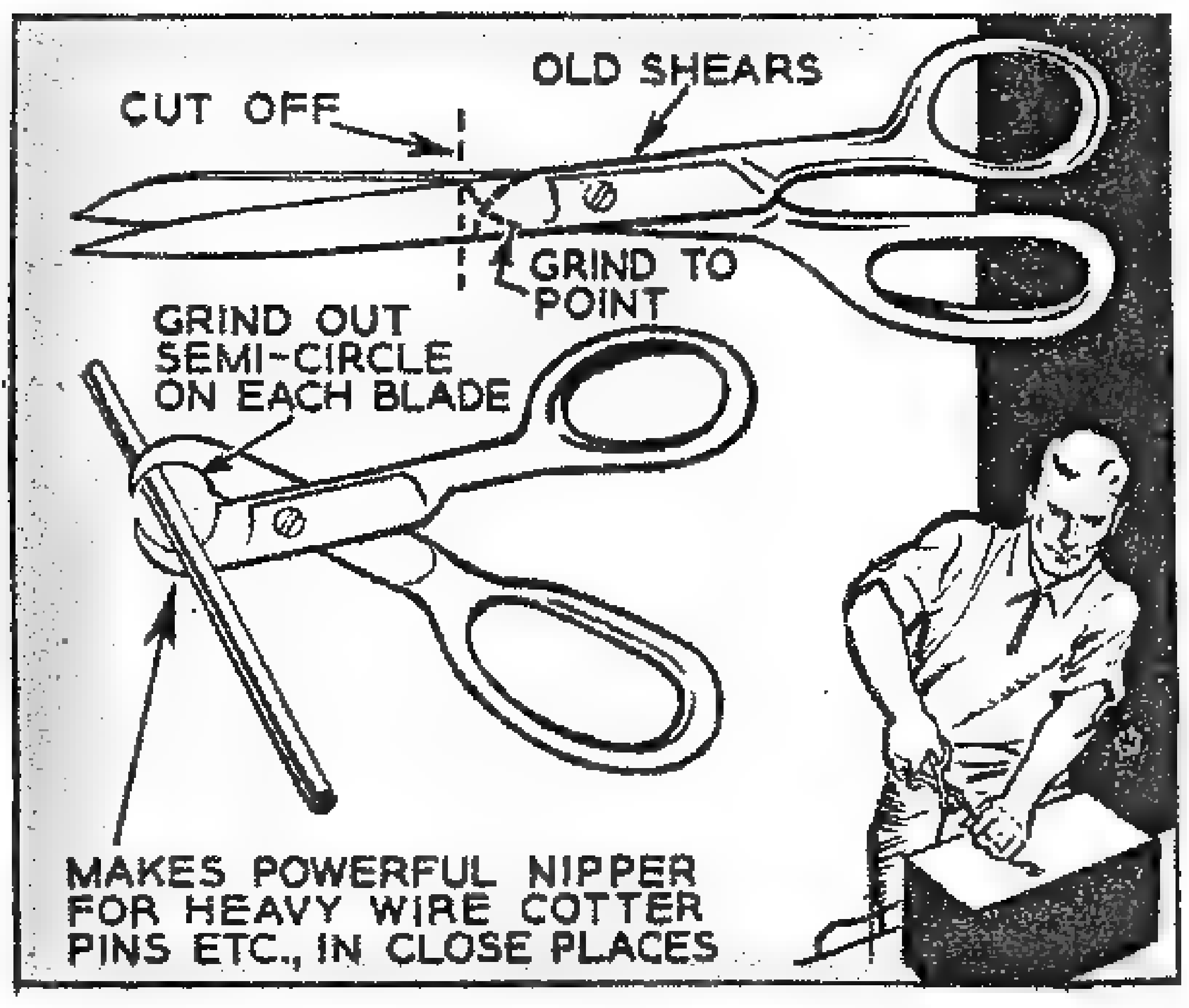

2 WASHERS NEEDED
CUT WOOD PULLEY
PIECE OF RUBBER HOSE WIDER THAN PULLEY
MAY BE CUT IF NEEDED
HOLES FOR SHAFT
BOLT HOLES
PULLEY
BOLT AND NUT
SHAFT
HOSE
SHAFT
BOLT DRAWS WASHERS TOGETHER TO BULGE HOSE AND HOLD PULLEY TO SHAFT
WASHERS

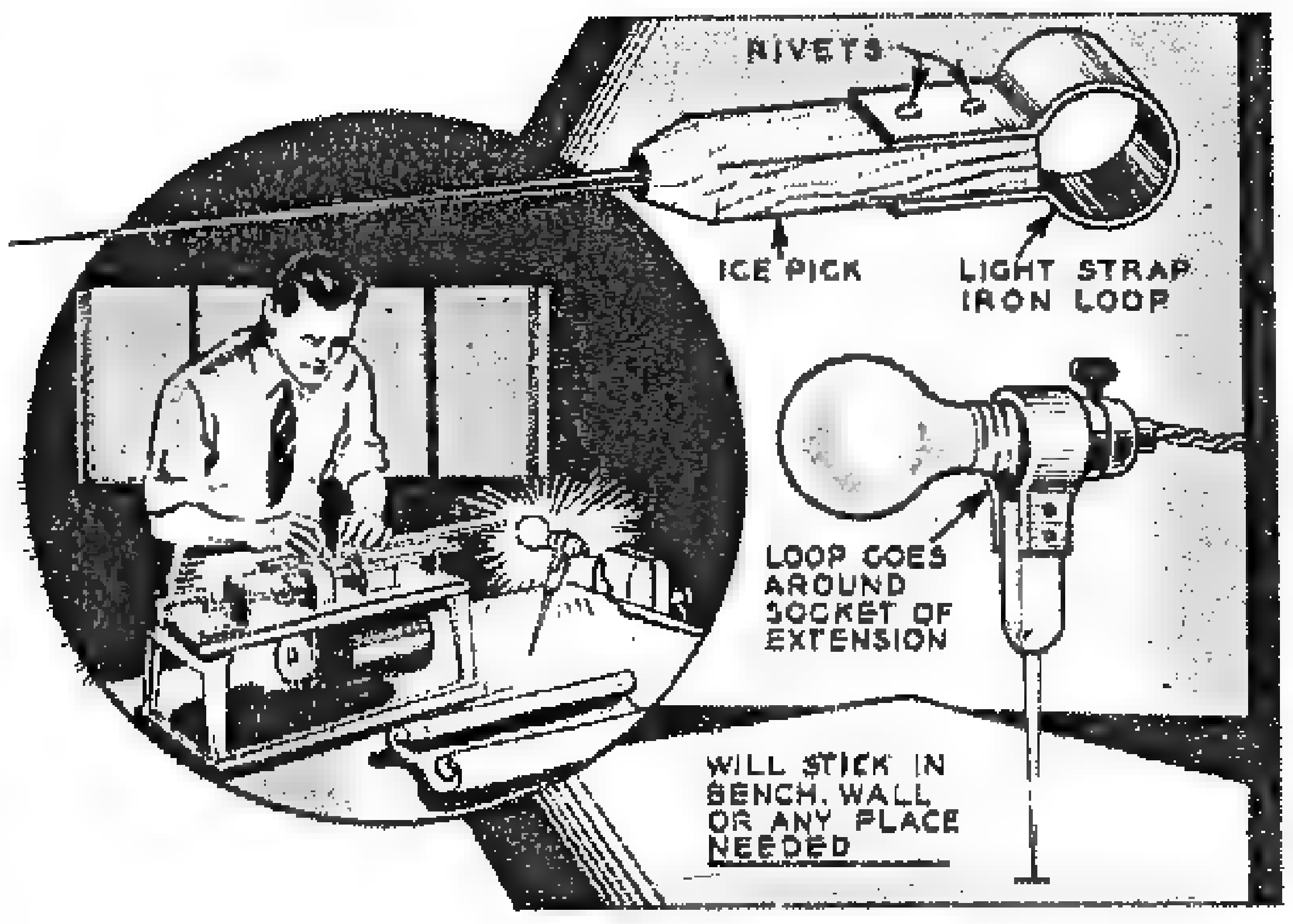
Making Wood Shop Machine Pulleys

WHERE shop machinery is driven by a line shaft drive it is often desirable to add additional machines from time to time. When a suitable shaft pulley is not available a practical substitute can be cut from a block of hardwood. Drill a hole in the center of the disc large enough to pass a short piece of garden hose then drill three equally spaced holes around the center hole for the clamp bolts. Drill similar spaced holes in two large washers and slip the assembly on the shaft. Tighten the bolts to bulge the garden hose and the pulley is ready for use.—A. H. Waychoff, Tempe, Arizona.

Shears Make Powerful Wire Snips

A PAIR of shears which are no longer suitable for their intended purpose can be made into a pair of powerful wire cutting snips. Break or cut off the blades near the fulcrum screw and grind out a semi-circular blade and round off the broken ends. Sharpen the curved blade with a small sharpening stone and light lubricating oil. After securing a satisfactory edge the shears may be hardened by heating red hot and plunging in old cylinder oil. The shears treated in the prescribed manner will cut heavy gauge wire with ease.—A. H. Waychoff.


OLD SHEARS
CUT OFF
GRIND TO POINT
GRIND OUT SEMI-CIRCLE ON EACH BLADE
MAKES POWERFUL NIPPER FOR HEAVY WIRE COTTER PINS ETC., IN CLOSE PLACES


RIVETS
ICE PICK
LIGHT STRAP IRON LOOP
LOOP GOES AROUND SOCKET OF EXTENSION
WILL STICK IN BENCH, WALL OR ANY PLACE NEEDED

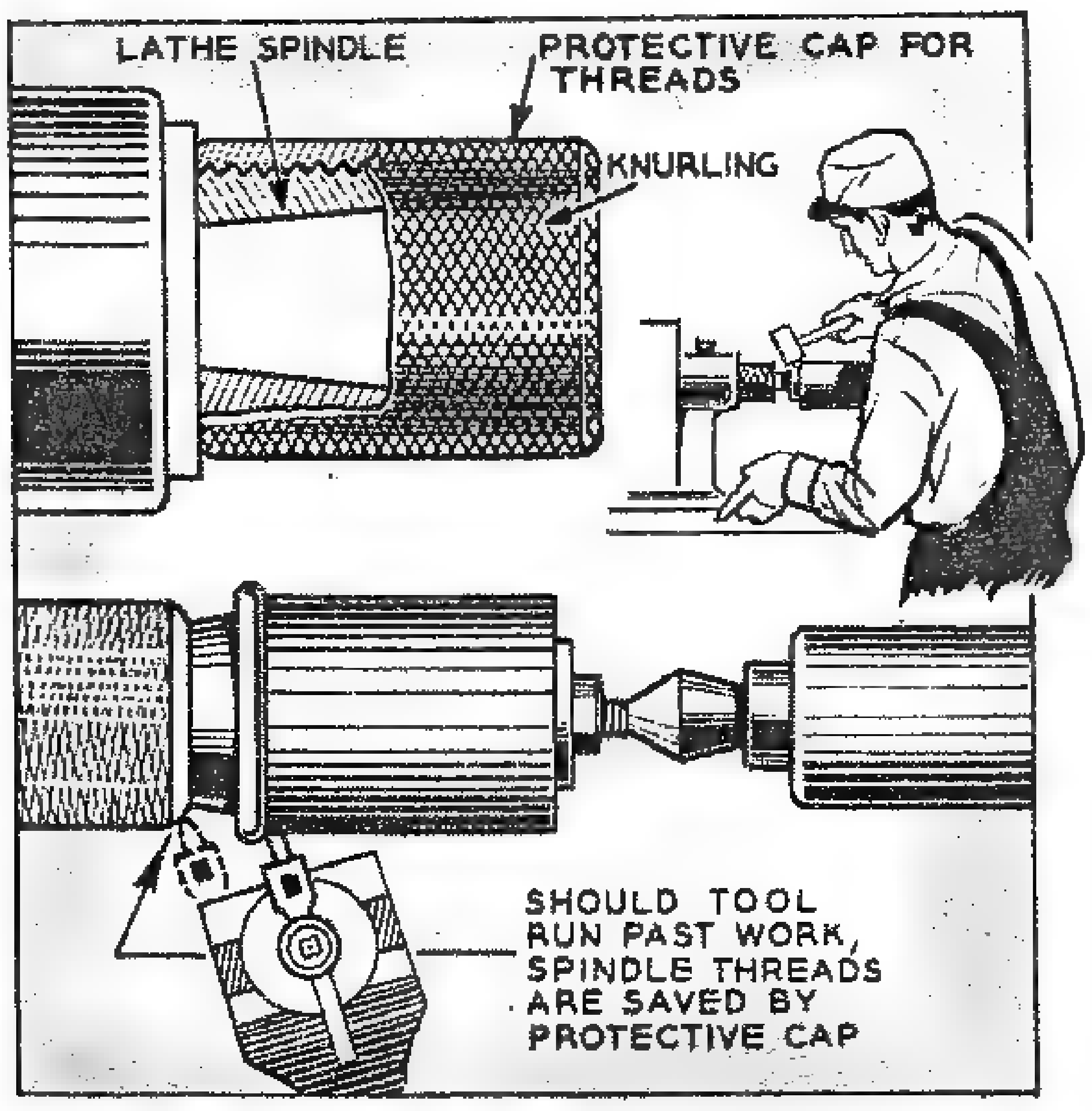
Ice Pick Supports Extension Light

A SATISFACTORY method of illuminating the workbench often becomes quite a problem when doing special machine operations. An extension light that can be set up anywhere, simply by sticking it into the workbench or any convenient piece of wood, can be quickly constructed by fastening the light socket to an ice pick handle by means of a metal band. The ice pick permits the light to be placed anywhere.—A. Waychoff.

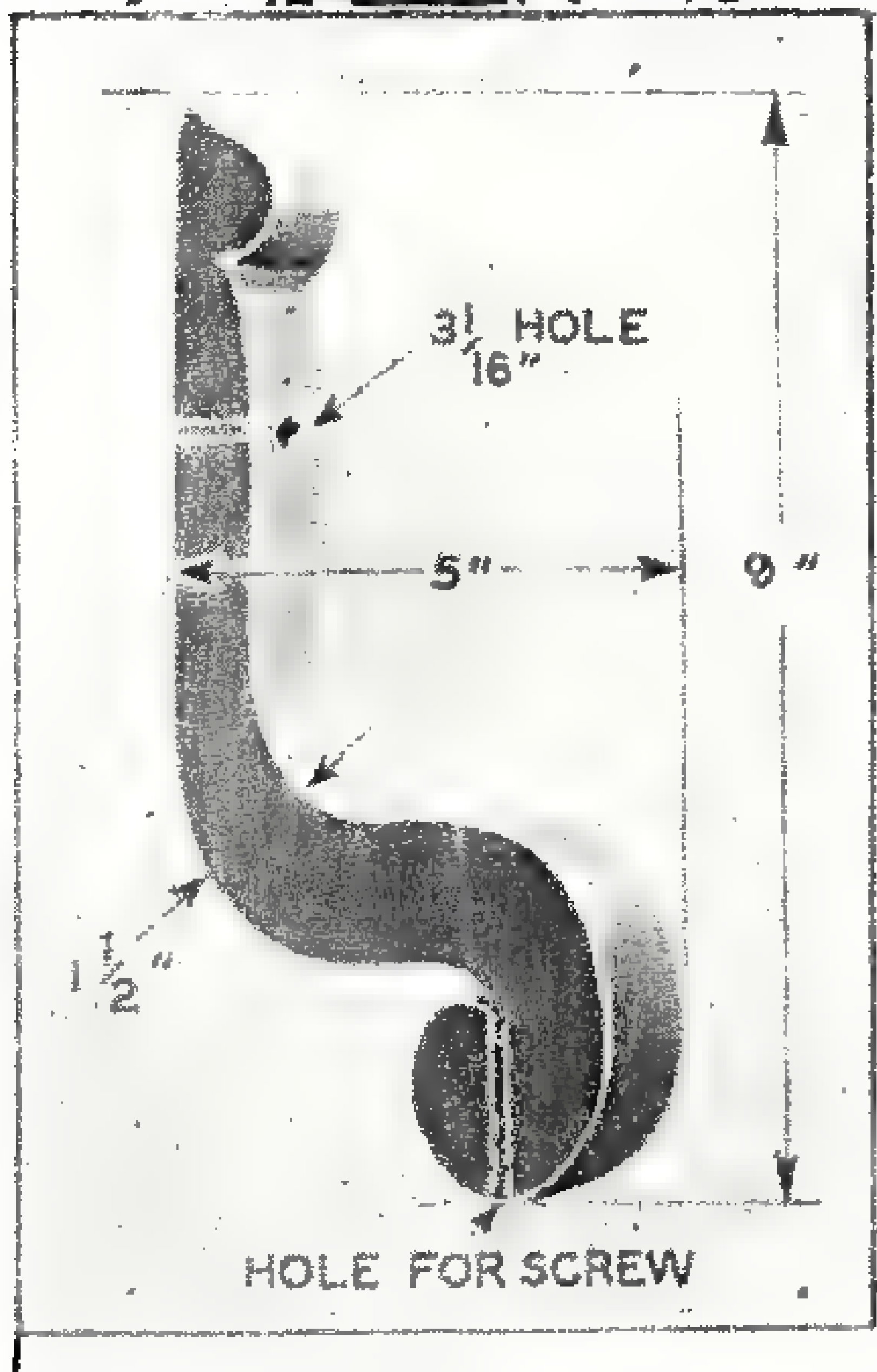
Cap Protects Lathe Spindle Threads

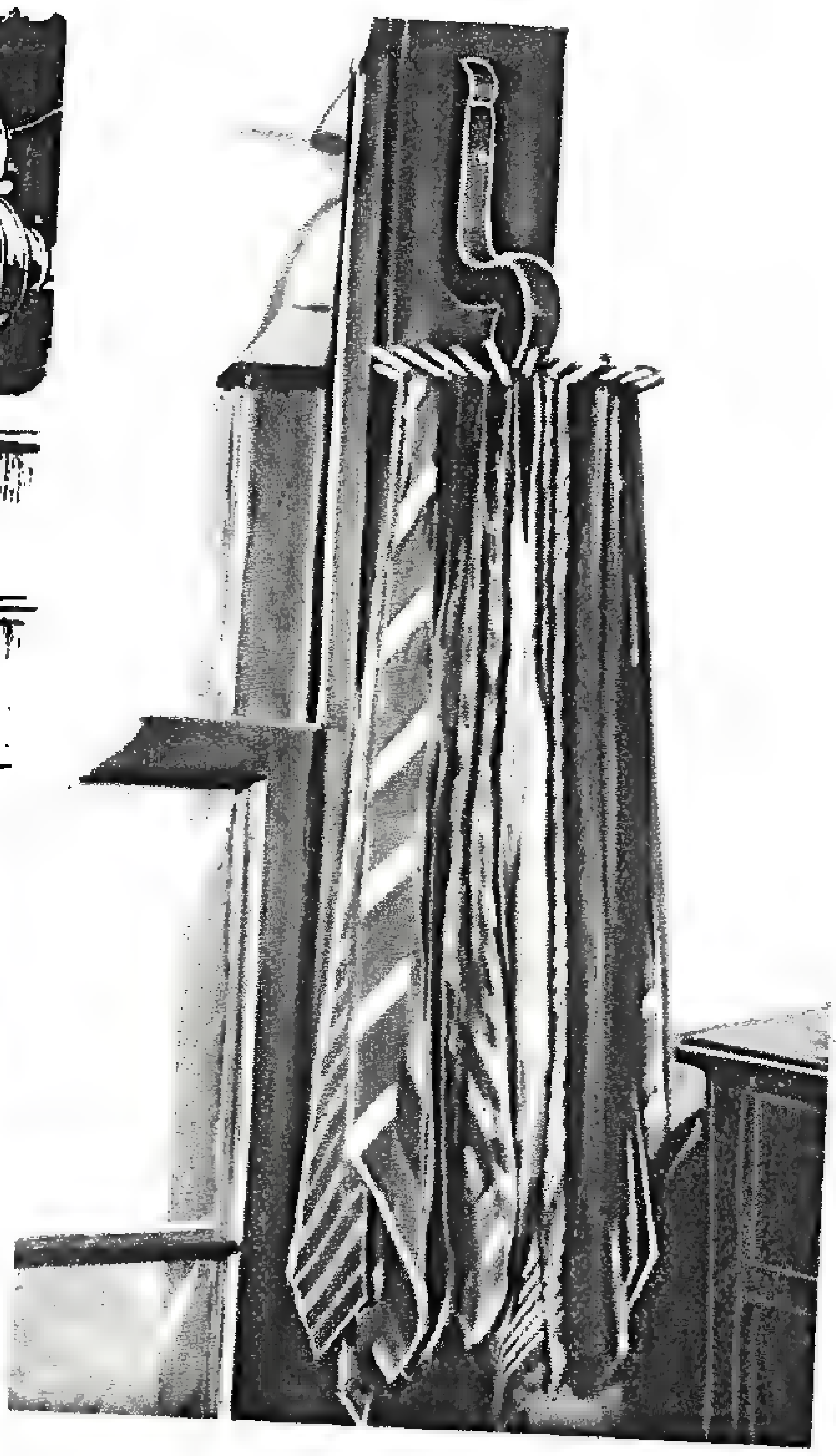
UPON the removal of the face plate on a metal lathe the spindle threads are exposed to accidental hammer blows and tool scars which are likely to impair the accuracy of this vital part of the machine. A simple turned brass cap to fit over the spindle will protect it against any accidental damage.

Turn down the cap from a length of brass tubing. Make the cap long enough so that it will project a little beyond the end of the spindle. When the cap is in place work may be turned down or milled without danger of the spindle accidently becoming damaged by the cutting tool running wild.—D. W. Prince, Quincey, Mass.

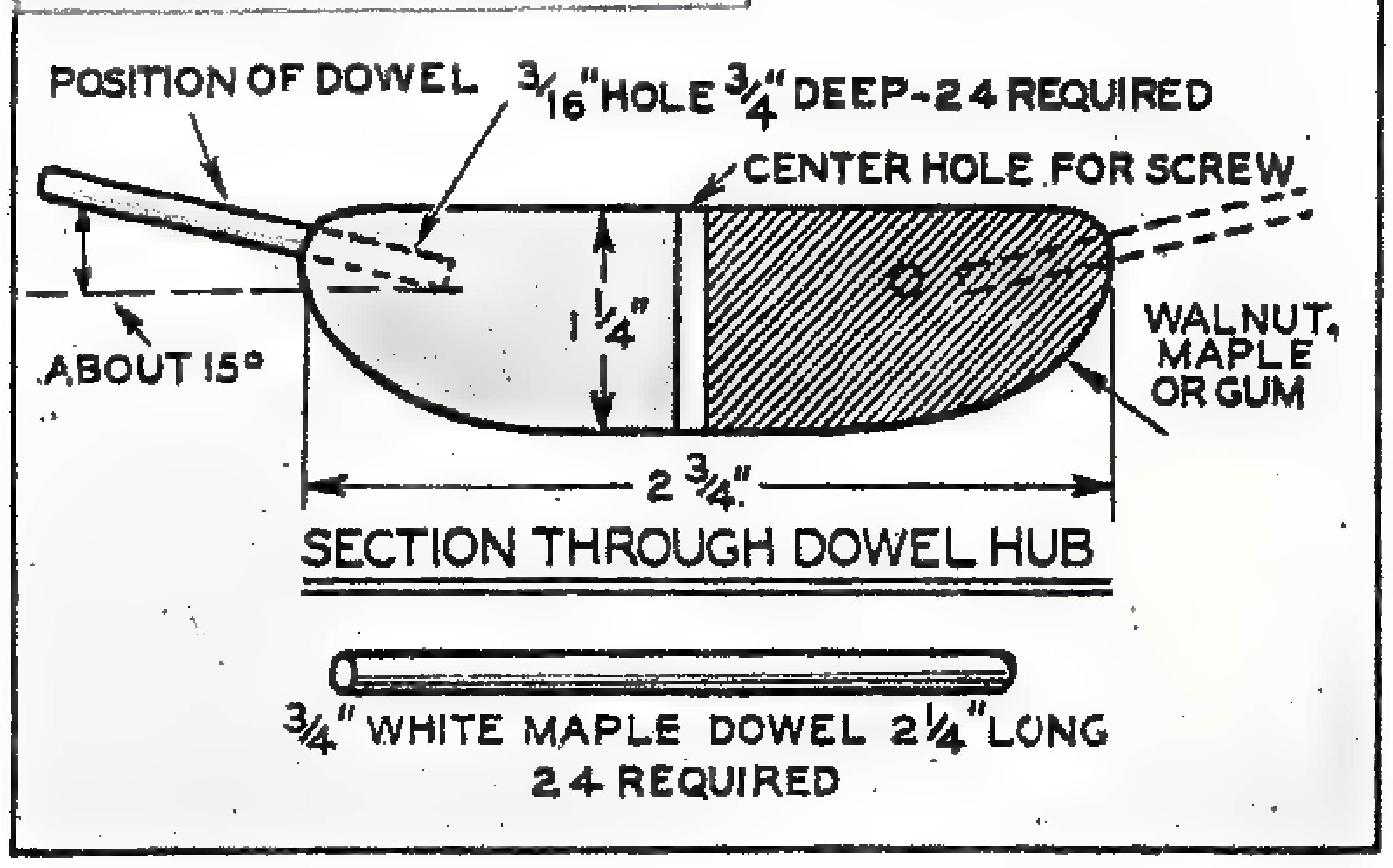

LATHE SPINDLE
PROTECTIVE CAP FOR THREADS
KNURLING
SHOULD TOOL RUN PAST WORK, SPINDLE THREADS ARE SAVED BY PROTECTIVE CAP

NOVELTIES


3/16" HOLE
5"
9"
1 1/2"
HOLE FOR SCREW



This attractive tie rack provides a convenient place for hanging 24 neckties for selection at random. The rack consists of a revolving hub to which are attached wooden dowels. A scrolled bracket permits rack to be fastened to wall.


POSITION OF DOWEL
3/16" HOLE 3/4" DEEP-24 REQUIRED
CENTER HOLE FOR SCREW
1 1/4"
ABOUT 15°
WALNUT, MAPLE OR GUM
2 3/4"
SECTION THROUGH DOWEL HUB
3/4" WHITE MAPLE DOWEL 2 1/4" LONG
24 REQUIRED

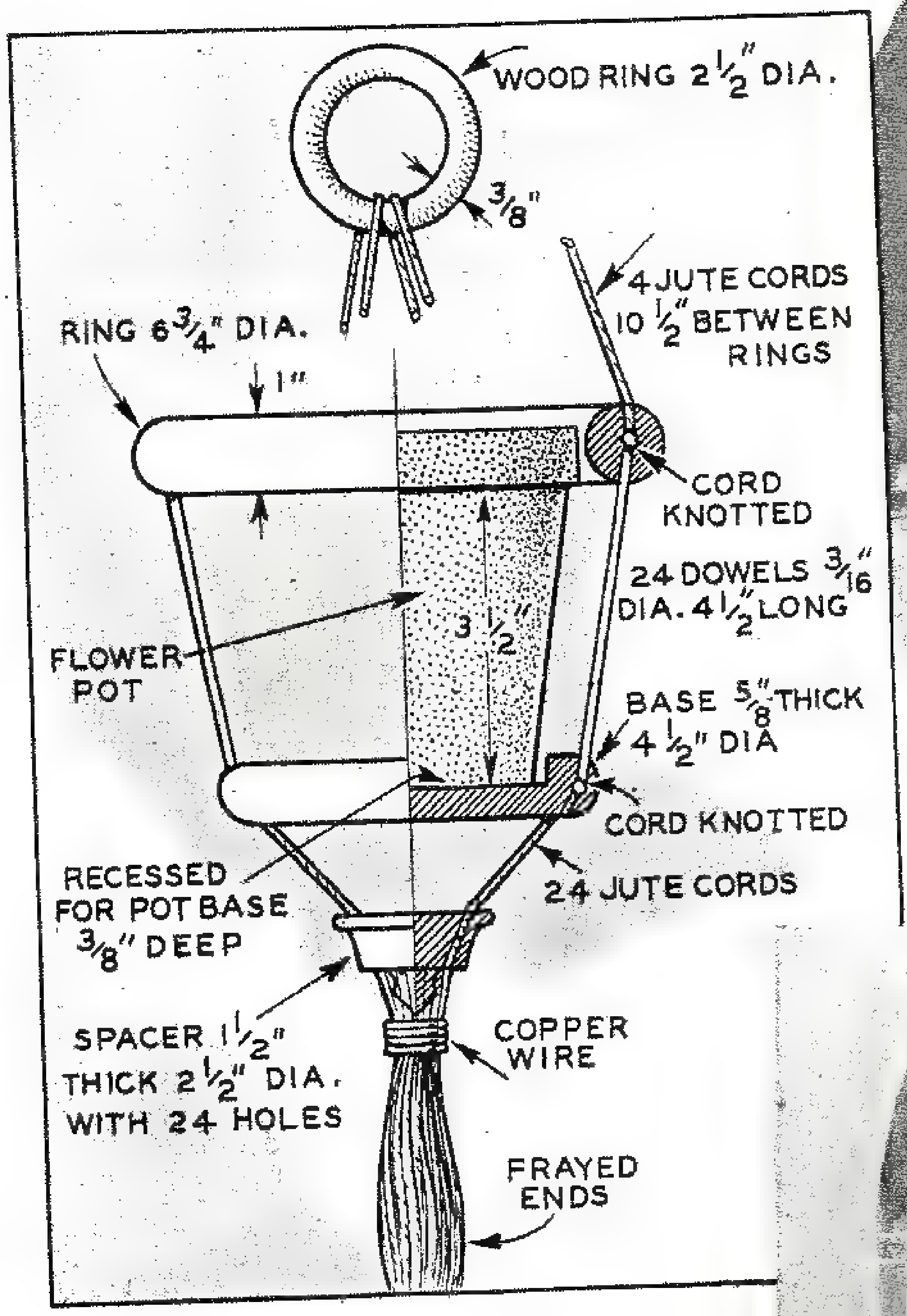
by Dale R. Van Horn

THESE simple woodworking projects were designed simply to make use of the assortment of scrap stock that eventually collects in the home workshop. Any one of them can be completed in a single evening if ambitiously tackled or in two evenings if a shorter period of time is spent on their construction.

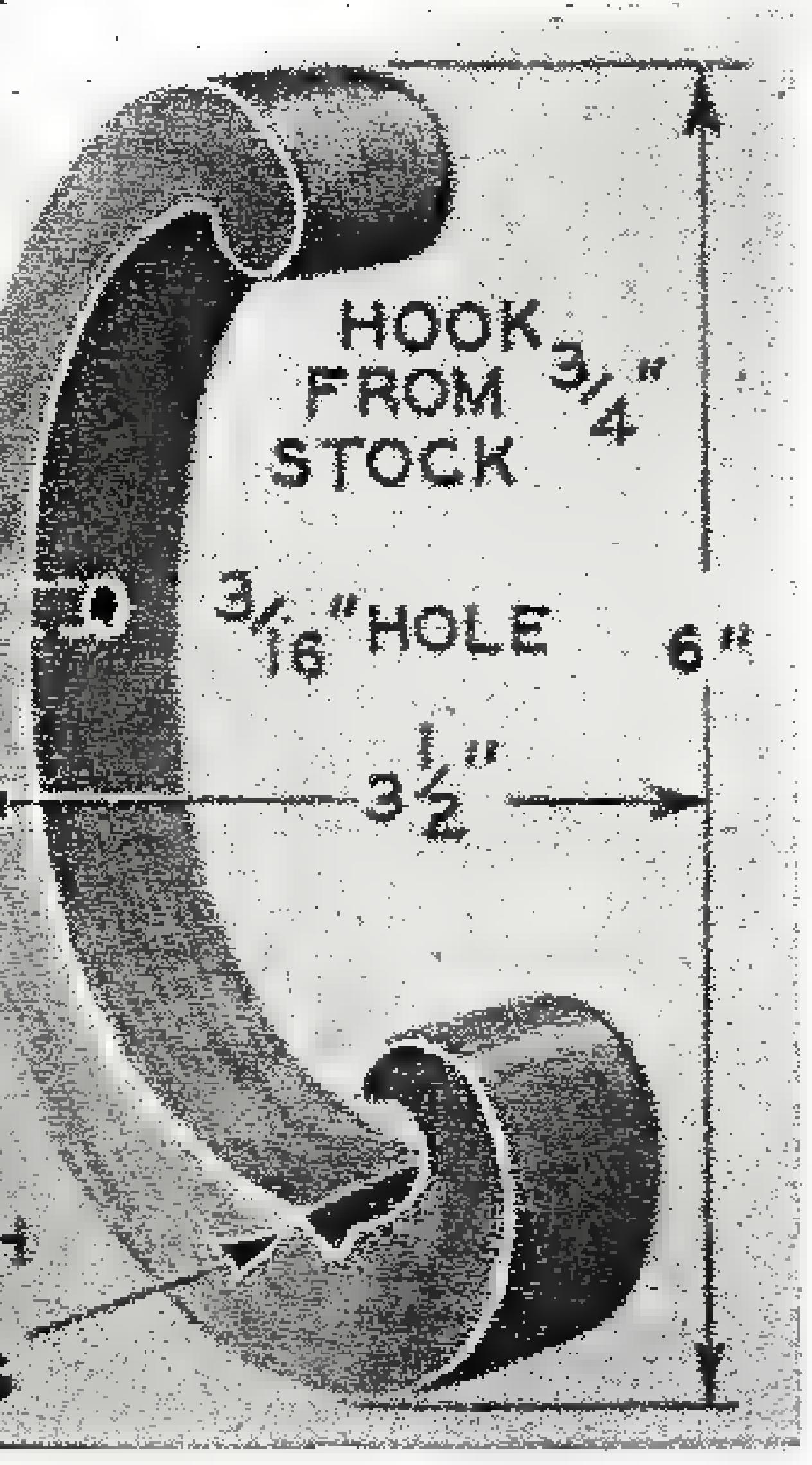
If you own a wood turning lathe a piece of scrap walnut or figured gum can be transformed into a unique tie rack that will hold 24 ties for prompt selection. The rack consists of a turned hub from which projects 24 spokes. The hub is attached to the wall by a single screw mounting bracket and revolves so that any tie can be selected in the same manner as clothing is selected from a revolving display rack.

By referring to the accompanying diagrams no difficulties in construction will be encountered. Turn down the hub to a diameter of 2¾ inches then drill 24 holes at equal intervals large enough to take the $\frac{3}{16}$-inch dowels. Last cut out the wall bracket on a scroll or band saw to the shape indicated and finish the completed tie rack in a natural finish or enamel. A single screw holds it to

IN WOOD


WOOD RING 2½" DIA.
3/8"
4 JUTE CORDS 10½" BETWEEN RINGS
RING 6¾" DIA.
1"
CORD KNOTTED
24 DOWELS 3/16" DIA. 4½" LONG
FLOWER POT
3½"
BASE 5/8" THICK 4½" DIA
CORD KNOTTED
RECESSED FOR POT BASE 3/8" DEEP
24 JUTE CORDS
SPACER 1½" THICK 2½" DIA. WITH 24 HOLES
COPPER WIRE
FRAYED ENDS

Turned on a lathe from scrap pieces of gum this hanging plant basket proves a novel home decoration. The above diagram gives the cross-section details.


HOOK FROM ¾" STOCK
3/16" HOLE
6"
3½"
NOTCH FOR RING

The completed hanging basket is supported by a hook cut from ¾" stock. Follow the dimensions at left, cutting hook from walnut.

the wall. A hanging plant basket containing an ivy vine will brighten up the corner of any room. A very attractive basket was created from several turned wood rings and a few yards of jute cord.

The rings are turned from 1-inch walnut or gum stock by attaching a squared block to the faceplate of the lathe, turning one-half and then reversing the block and completing the ring. Allow the center of the ring to remain as part of the ring itself until it is removed from the lathe. The center portion can be removed with a sharp knife. The lower and smaller ring is given only half the operation mentioned above. After turning the edge of the ring cut out the center recess to a depth of 3/8-inch. Drill 24 uniformly spaced holes through each ring for passing the cords. Knot these so that the rings do not shift their positions. Bring the cords together at the bottom of the basket through a 1½-inch spacer ring fraying the ends of the jute cord to provide a tassel effect.

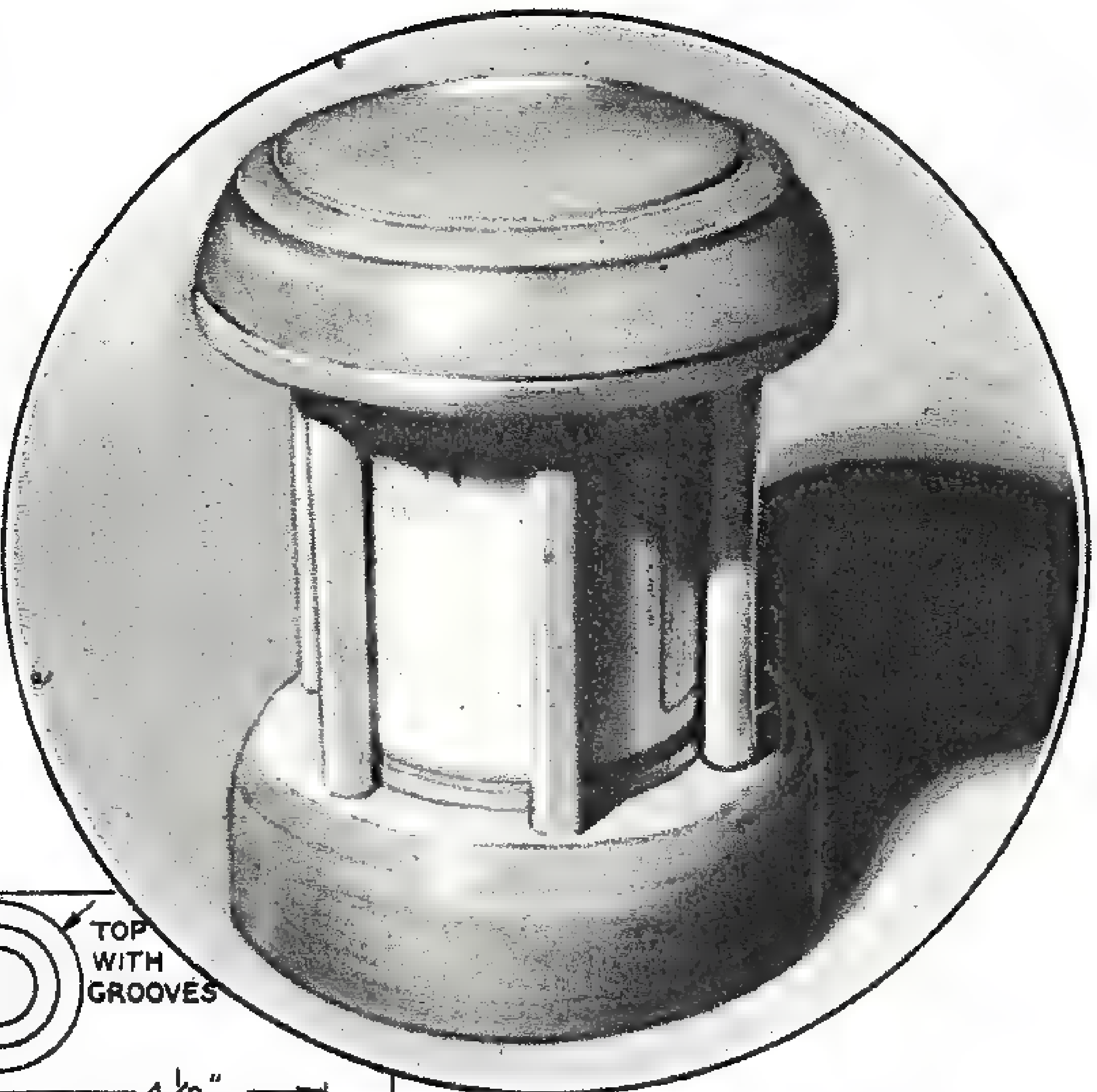
Before threading the cord through the rings finish them in natural colors with a shellac or varnish for a lasting and durable surface.

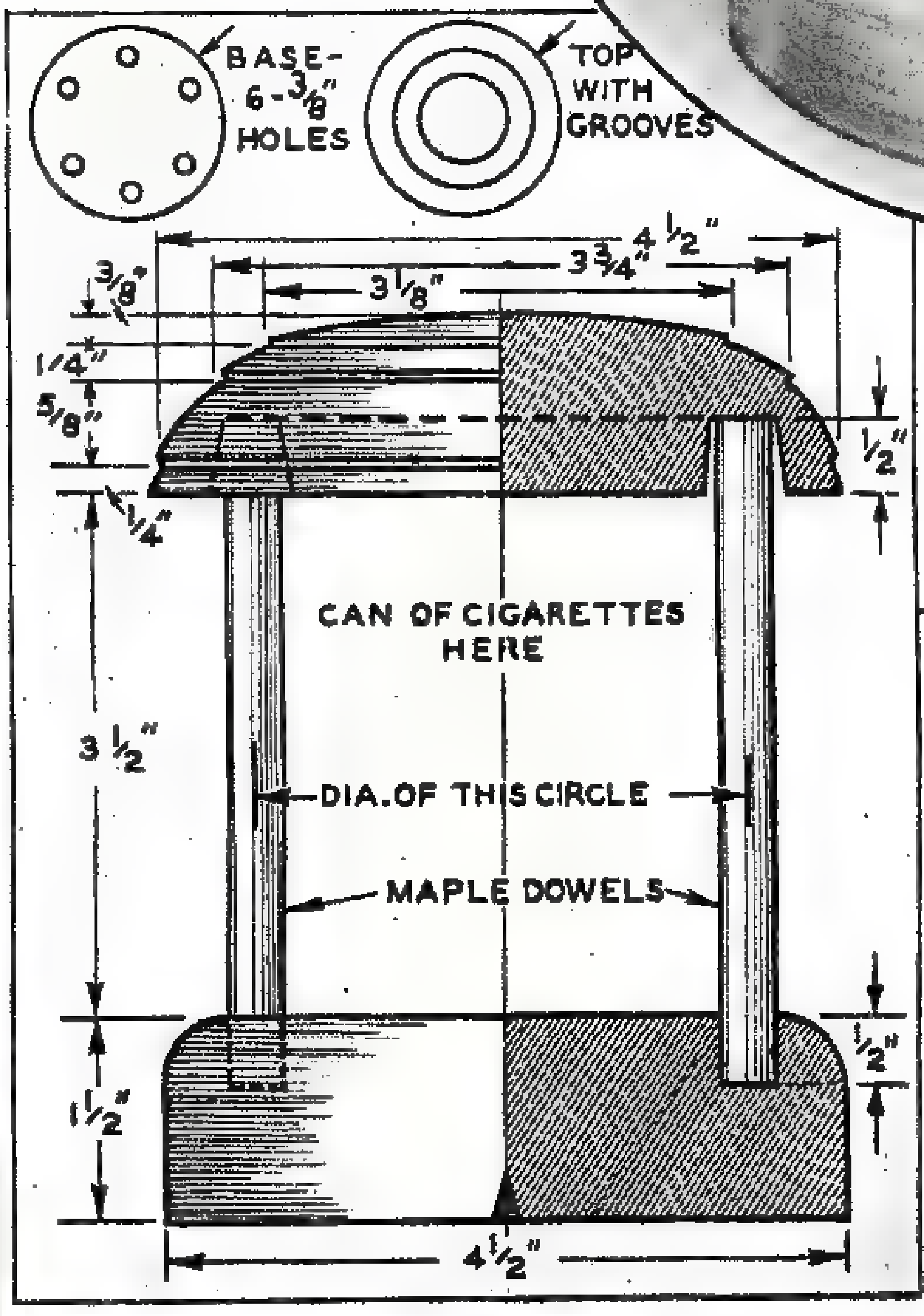
A dowel cigarette box is something that anyone with only a slight knowledge of woodworking can make. It consists merely of two discs, turned down on the lathe and drilled to receive 6¼-inch wood dowels. The top disc is cut in two sections to provide a lid effect. After the dowels have been glued in place and allowed to dry the cigarette box is finished in bright enamels or in natural colors. A sheet of colored celluloid may be inserted and cemented inside the dowel assembly to hide the lithographed printing on the vacuum tin in which the cigarettes are packed. These cigarette boxes make excellent bridge prizes or you can give them to friends as souvenirs from your workshop.

The last project to be described will interest every housewife who finds it necessary to do an occasional bit of mending. It provides a neat arrangement for storing scissors, thread and needles and can be made manufactured in the home workshop in a single evening. The base is turned from a 5-inch square of ⅝-inch hardwood to a diameter of 4¾ inches. At equal distances drill 8 holes for inserting $\frac{3}{16}$-inch dowel or skewer rods. When attached to the base the rods should be slightly higher than the heighth of two spools.

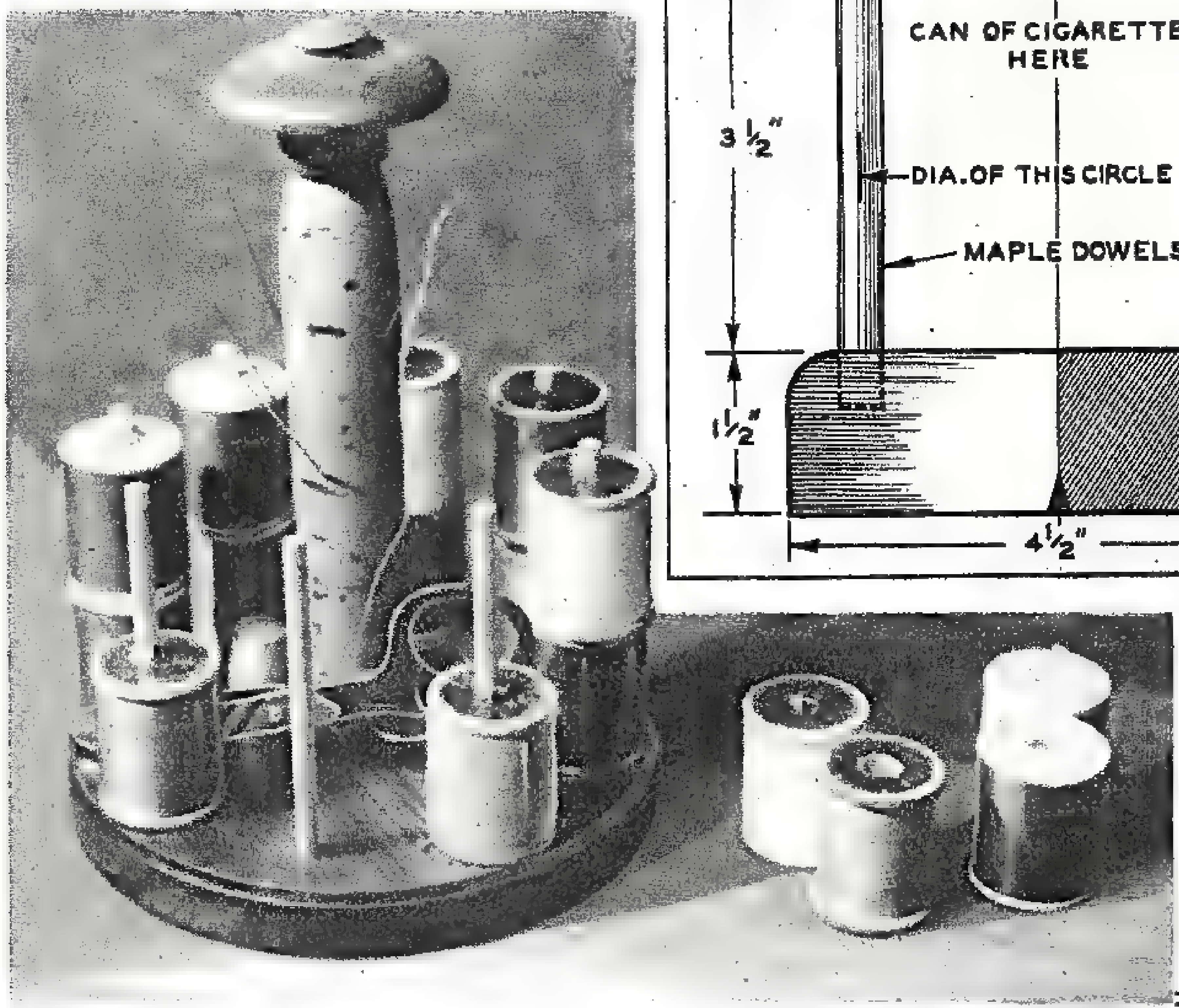
The pin-cushion is a novel arrangement which consists of a number of 1-inch diameter corks drilled through the center to pass a ⅜-inch dowel. The dowel is glued in the center hole provided in the base of the sewing kit with a small hardwood knob attached to top to serve as a convenient carrying handle.

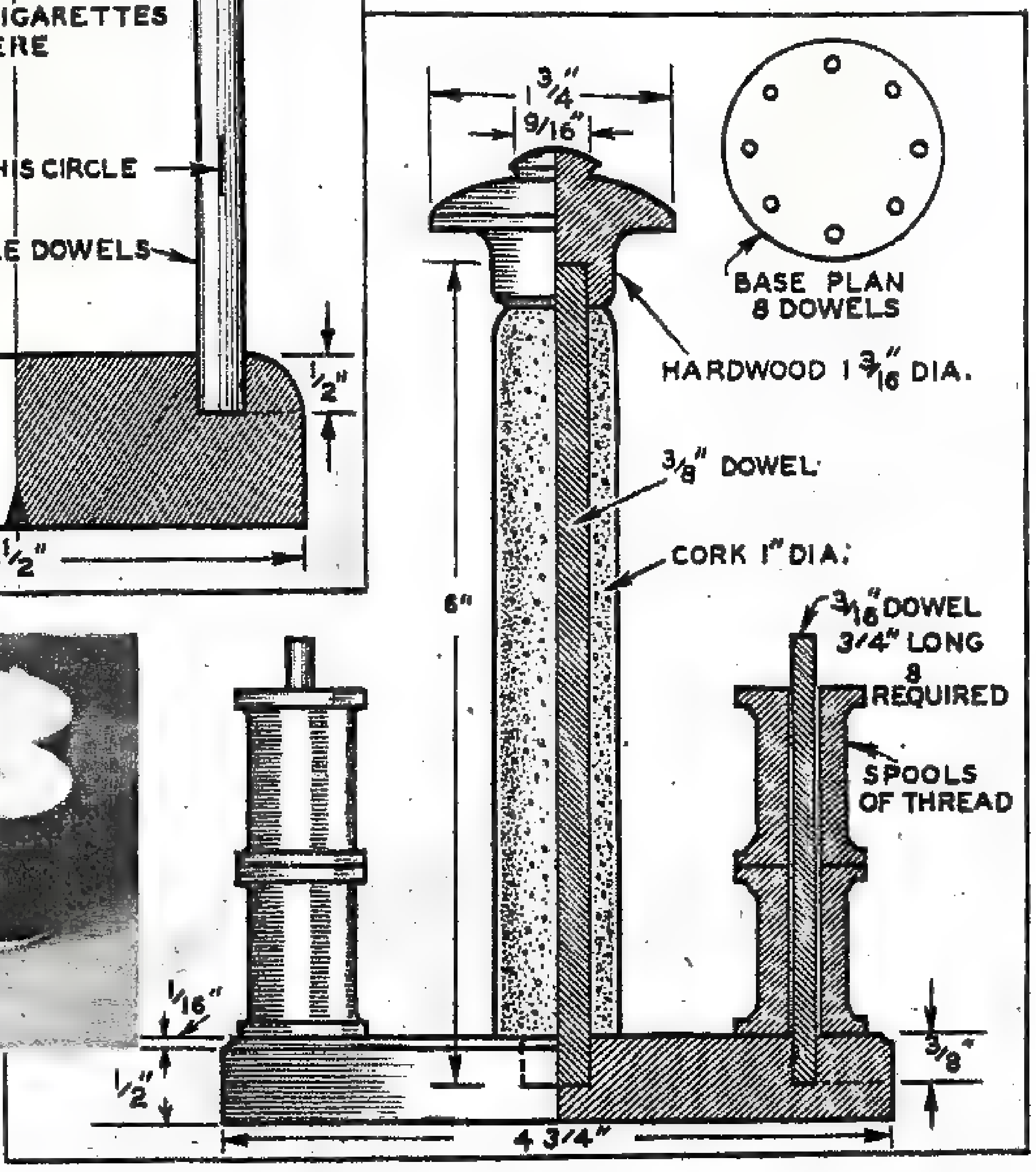
Any hardware store can supply corks suitable for the pin-cushion. If ones having a uniform diameter are not available and tapered corks must be used, they should be sufficiently large enough to permit them to be turned down after they have been glued to the center dowel rod support. For turning down the corks to a uniform diameter use strips of sanding paper starting with a rough and working down to a fine grade. A lathe tool is of little value in cutting cork.





Vacuum tins of cigarettes can be dressed up by fitting them in small dowel containers like the one pictured above. Turn discs from birch or gum. Dowel rods support the assembly. A celluloid liner hides the can.





Turned from odd pieces of wood this simple sewing kit will be welcomed by the homemaker. Base is provided with dowels for holding 16 thread spools. Pins and needles are stuck in cord handle. Handle is wood dowel over which carks are glued.

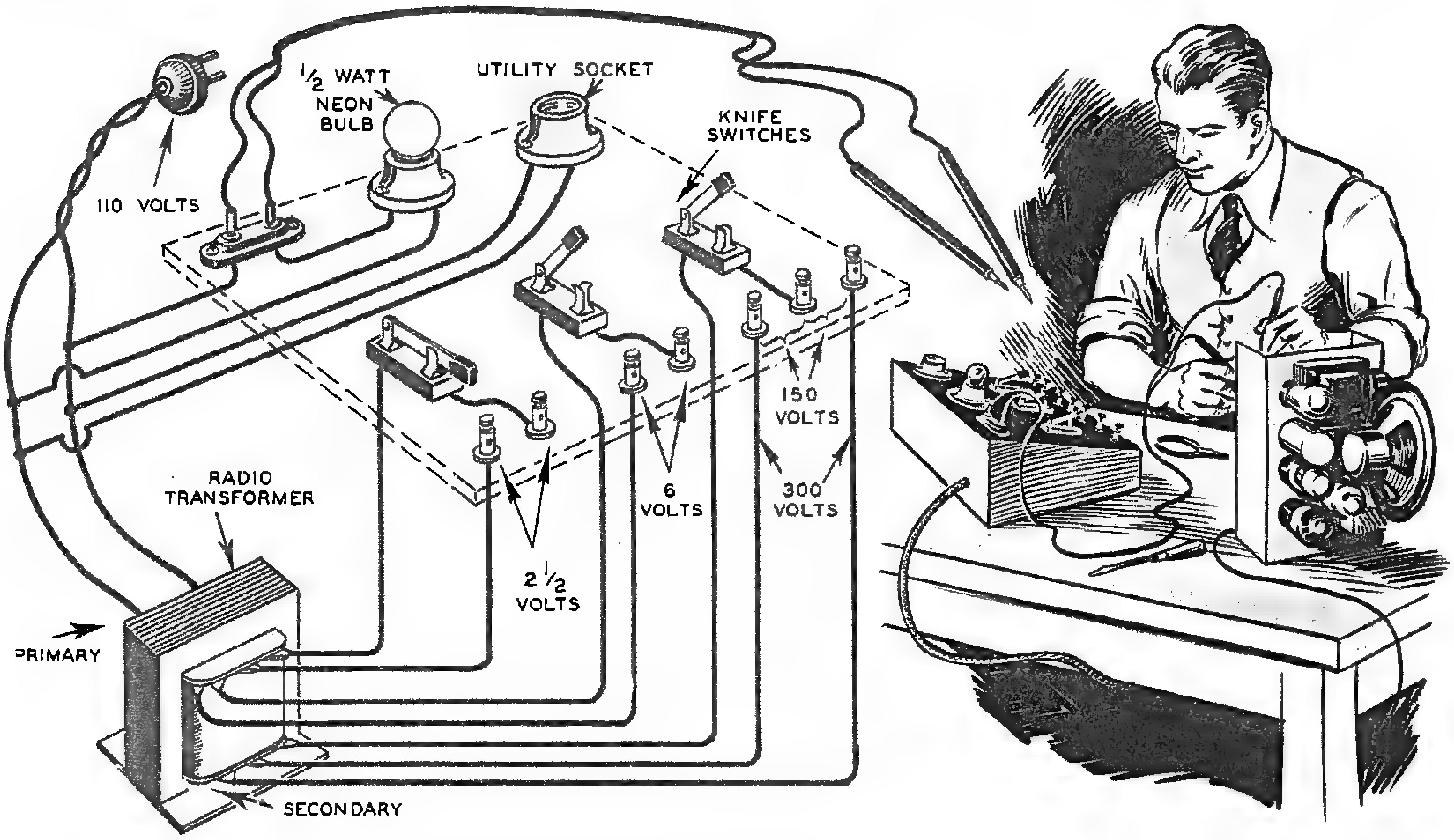
After completing the necessary lathe work finish the sewing kit in the same manner as described for the other projects.

All four of these workshop articles involve only simple construction so that even the most inexperienced craftsman can duplicate them. Like any other projects, care should be exercised in their making since a well made simple project is worth considerably more than a poorly made elaborate one.

Any one of the articles just described will make an interesting class project for manual training students. The fact that the materials cost is practically nothing, makes them doubly suitable for student use. It is important, too, that all joints be securely glued and all excess glue wiped off with a damp cloth so that no white spots show through stain.

RADIO SPARKS and ELECTRICAL EXPERIMENTS

ELECTRICAL TEST PANEL HAS MANY USES


½ WATT NEON BULB
UTILITY SOCKET
KNIFE SWITCHES
110 VOLTS
150 VOLTS
300 VOLTS
6 VOLTS
2½ VOLTS
RADIO TRANSFORMER
PRIMARY
SECONDARY

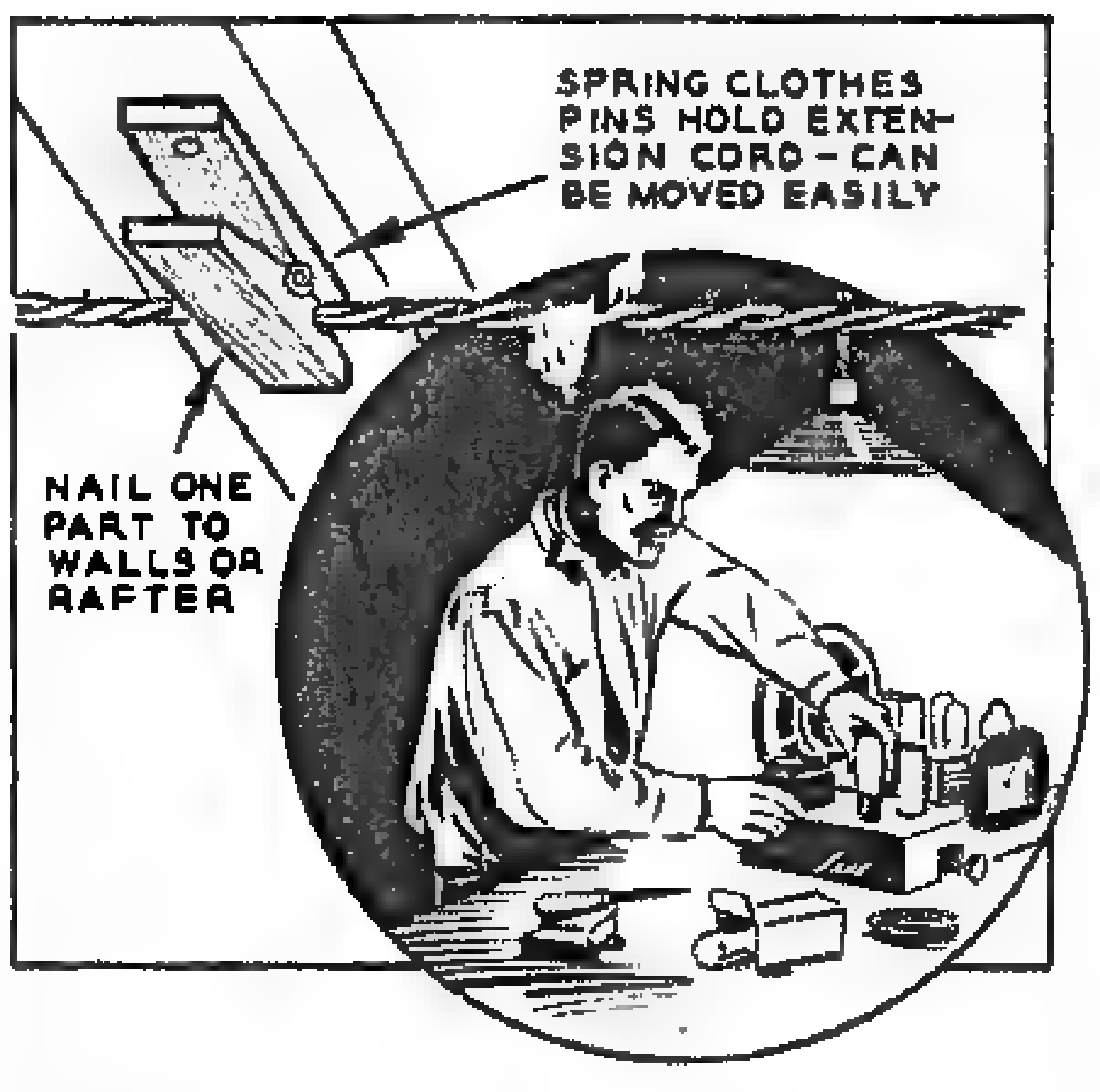
This electrical test panel is a useful piece of equipment for the radio or electrical experimenter's workbench. It can be built from parts salvaged from a junked receiver if new materials are not available for the purpose. A 300-volt transformer provides plate and filament voltages for experimental circuits. Neon lamp connected across 110-volt leads is handy point-to-point tester.

A TEST panel that serves a variety of purposes in the electrical or radio experimenter's workshop can be inexpensively constructed by anyone handy with tools. A radio power transformer with a center-tapped 300-volt winding and a 2½ and 6-volt filament winding is mounted in a sloping panel cabinet. Six binding posts are provided for connecting the transformer leads. Knife switches are provided for opening these circuits during test work.

A neon lamp connected across the 110-volt line provides a practical point-to-point tester which is useful in both radio and electrical testing. Test prods plug into a double jack located at the top of the panel next to the neon lamp. Open circuits as well as faulty parts can be quickly detected by connecting the test prods from one point of the circuit to another.

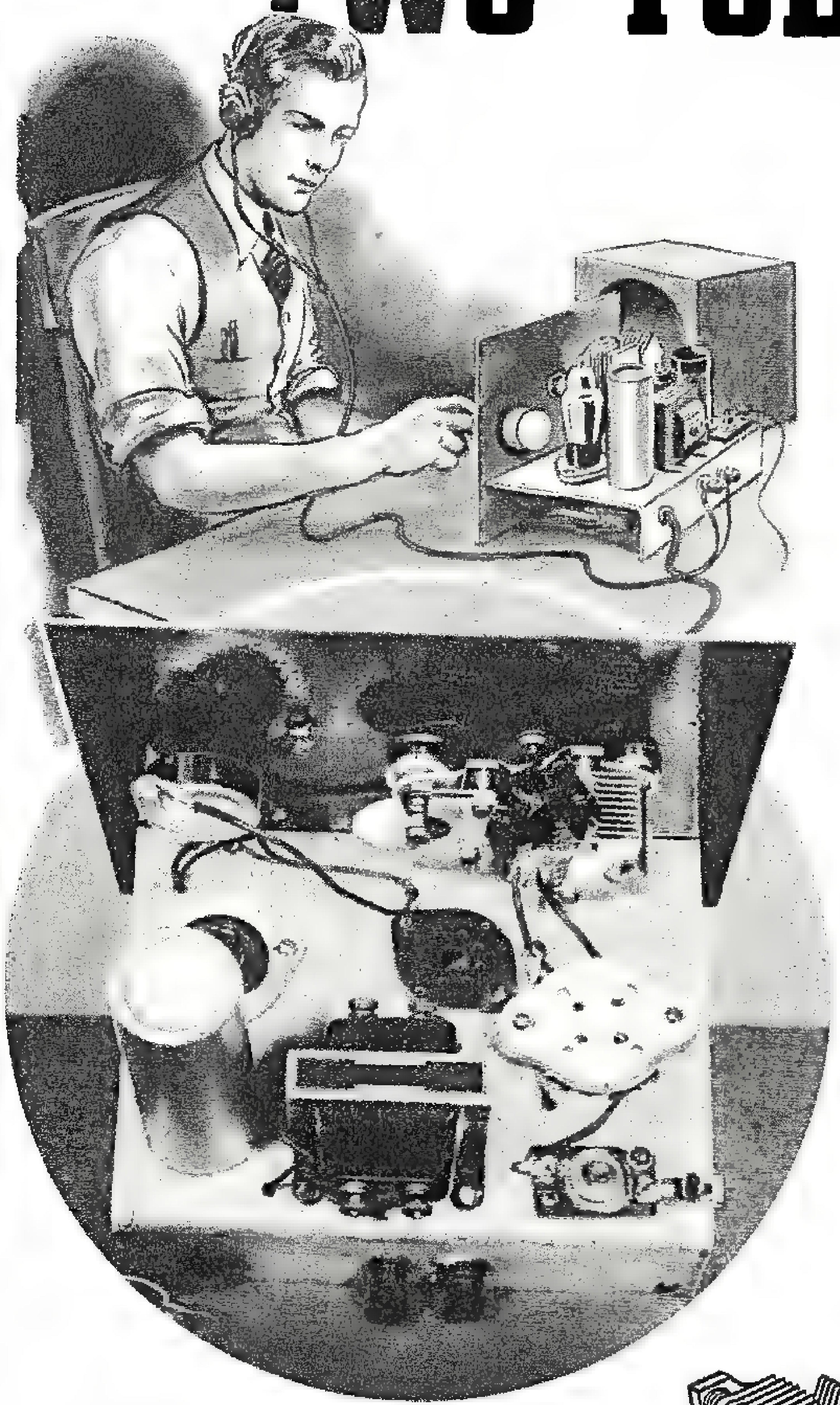
Clothes Pins Hold Cords

LOOSE extension cords lying around the workshop are not only a nuisance, but dangerous as well. A simple way to eliminate dangling cords is to install ordinary wooden clothes pins of the spring type on the walls and ceiling of the room. When a fixture cord is needed in another part of the workshop it is only necessary to clip it into the most convenient clothes pins.


SPRING CLOTHES PINS HOLD EXTENSION CORD - CAN BE MOVED EASILY
NAIL ONE PART TO WALLS OR RAFTER

Spring clothes pins attached to the walls and ceiling of workshop are useful for holding extension cords.

TWO TUBE SET TUNES

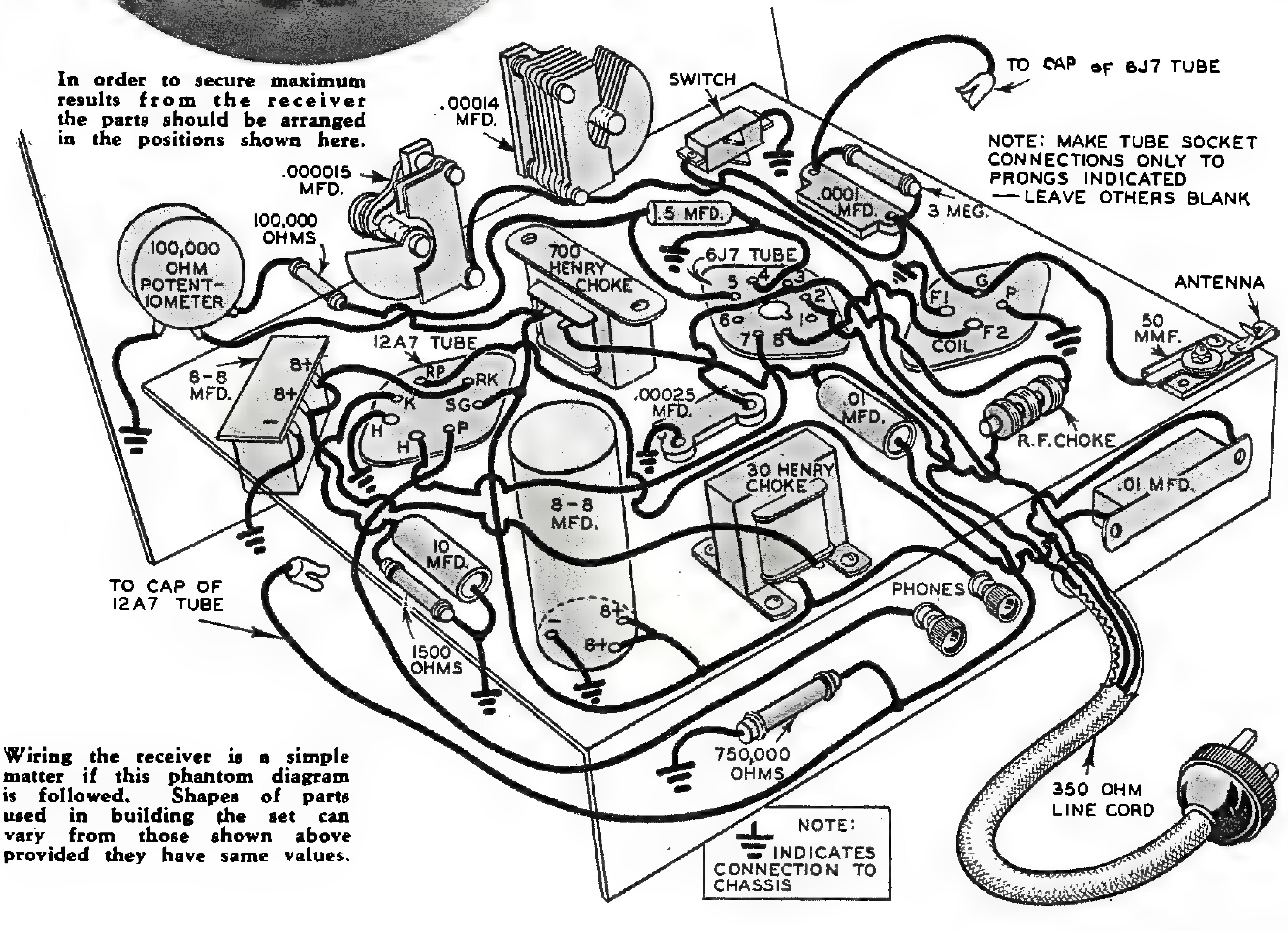


A metal and glass tube provides 3-tube performance for this all-electric set.

ONE metal and one dual-purpose glass tube are used in this compact receiver which will operate a speaker when tuned to many of the stations in the broadcast band and will give good headphone volume on the short waves. A novel AC-DC circuit, eliminating the need for extra power supplies, makes the receiver extremely flexible and allows its use wherever there is a power line. Strongly built and very compact, the set is readily portable and serves as an excellent "personal" radio.

The metal type 6J7 tube serves as a quiet and very sensitive electron coupled detector. This detector circuit has seen almost universal acceptance in the design of metal tube regenerative sets because of its inherent stability and simplicity of coil design. The 6J7 is impedance coupled to a type 12A7 combination power-pentode and rectifier tube.

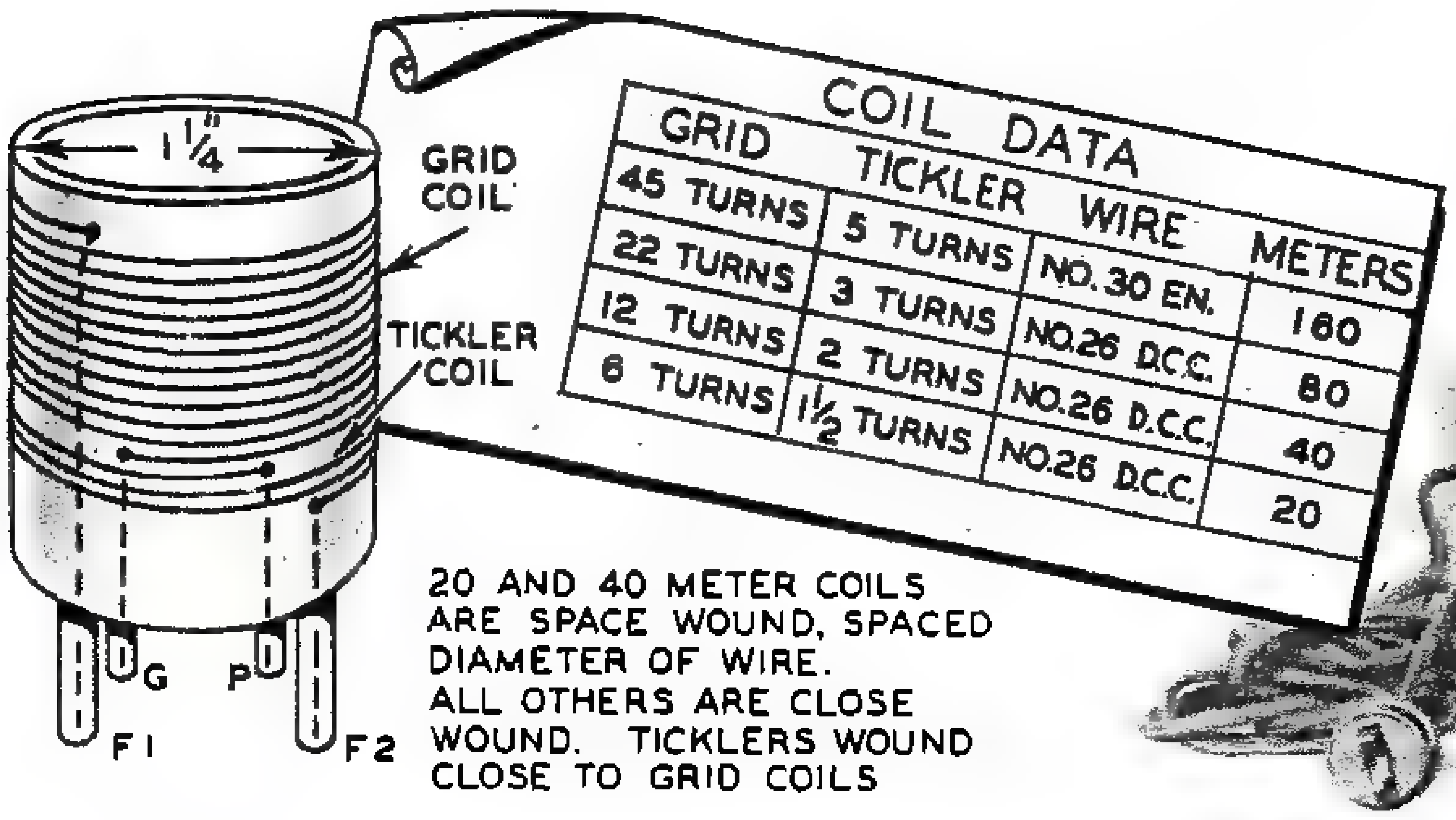
In order to secure maximum results from the receiver the parts should be arranged in the positions shown here.


TO CAP OF 6J7 TUBE
SWITCH
.00014 MFD.
.000015 MFD.
100,000 OHMS
100,000 OHM POTENTIOMETER
NOTE: MAKE TUBE SOCKET CONNECTIONS ONLY TO PRONGS INDICATED —LEAVE OTHERS BLANK
.0001 MFD.
3 MEG.
.5 MFD.
700 HENRY CHOKE
6J7 TUBE
5
4
3
2
1
6
7
8
G
P
F1
F2
COIL
ANTENNA
50 MMF.
12A7 TUBE
RP
RK
K
SG
H
H
P
8-8 MFD.
8+
8+
-
.00025 MFD.
.01 MFD.
R.F. CHOKE
.01 MFD.
30 HENRY CHOKE
8-8 MFD.
8+
8+
-
10 MFD.
1500 OHMS
TO CAP OF 12A7 TUBE
PHONES
750,000 OHMS
350 OHM LINE CORD
NOTE: INDICATES CONNECTION TO CHASSIS

Wiring the receiver is a simple matter if this phantom diagram is followed. Shapes of parts used in building the set can vary from those shown above provided they have same values.

IN THE WORLD

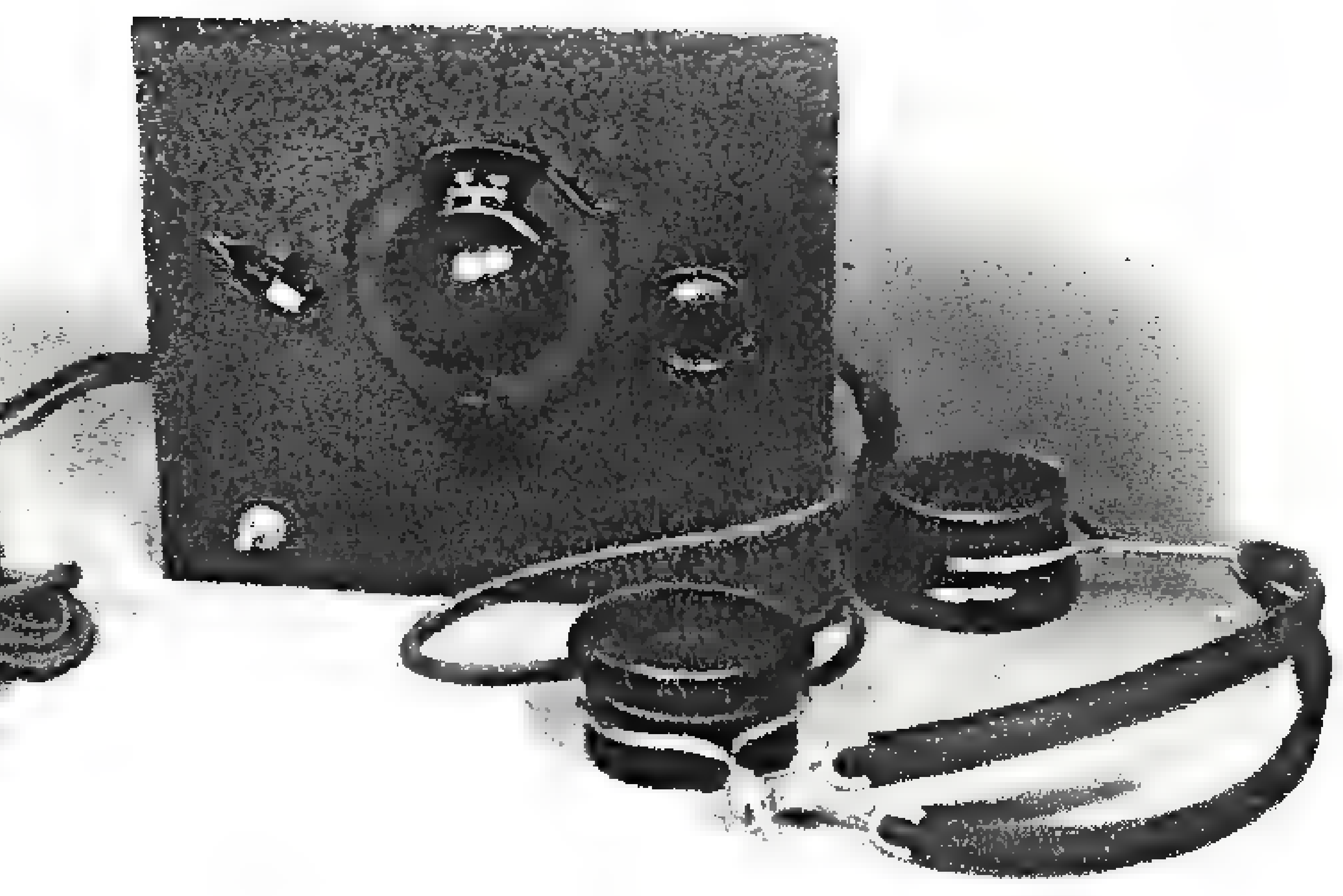
by Stanley Johnson


1¼"
GRID COIL
TICKLER COIL
G
P
F1
F2

COIL DATA

GRID	TICKLER	WIRE	METERS
45 TURNS	5 TURNS	NO. 30 EN.	160
22 TURNS	3 TURNS	NO.26 D.C.C.	80
12 TURNS	2 TURNS	NO.26 D.C.C.	40
6 TURNS	1½ TURNS	NO.26 D.C.C.	20

20 AND 40 METER COILS ARE SPACE WOUND, SPACED DIAMETER OF WIRE. ALL OTHERS ARE CLOSE WOUND. TICKLERS WOUND CLOSE TO GRID COILS



The coils for the various wavelengths may be wound on 4-prong tube bases if commercial coils are not available. If the set fails to oscillate reverse the coil leads P and F-2.

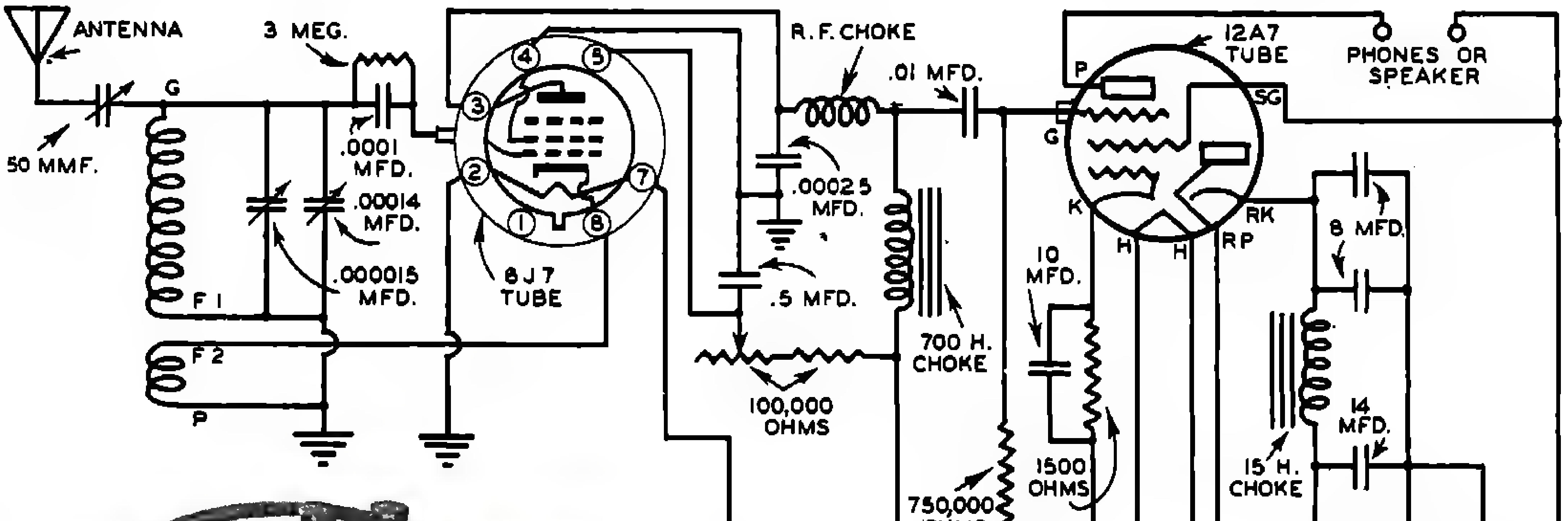
The 12A7 is capable of good audio output and its use allows three-tube performance with only two tubes.

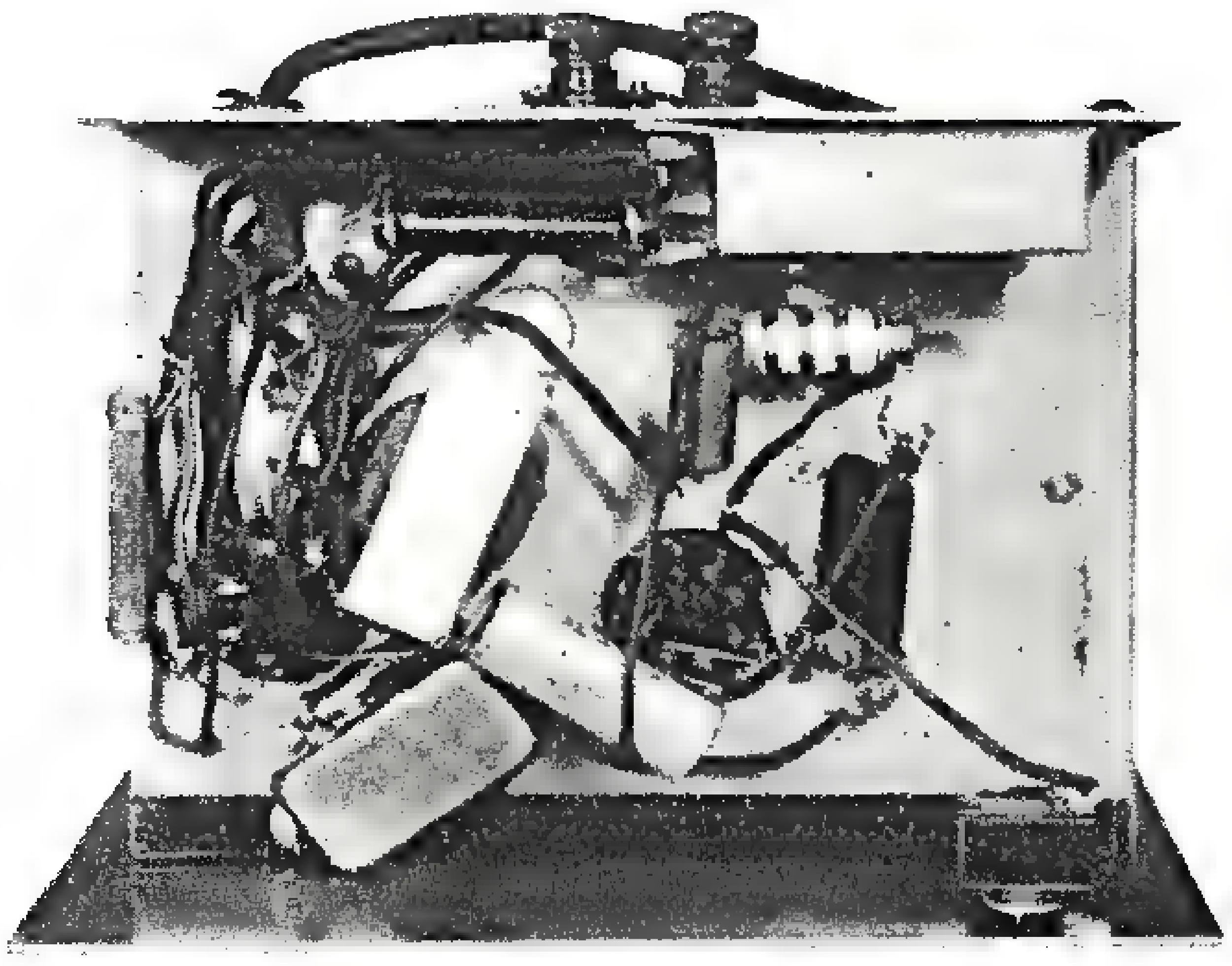
The parts are mounted on a metal chassis which consists of a 7x8-inch black crackle finished metal panel and a 2x5½x7-inch aluminum base. Since this set is to be used on the short wave bands as well as the broadcast band, placement of parts is important and for that reason the builder should follow the layout arrangement shown. Fractions of an inch do not matter; the important thing is to follow the same general arrangement.

Looking down on the set we see the tuning condensers and the volume control mounted on the panel. On the base, the coil socket is mounted directly behind the variable condensers, with the tube sockets to one side. At the back of the base is the coupling choke, the multiple electrolytic condensers and the antenna trimming condenser. The filter choke, the metal cased by-pass condenser and miscellaneous small resistors and condensers are mounted underneath the base.

Careful wiring is important to insure good results. Tuning leads should be short and stiff and all "ground" connections in the de-

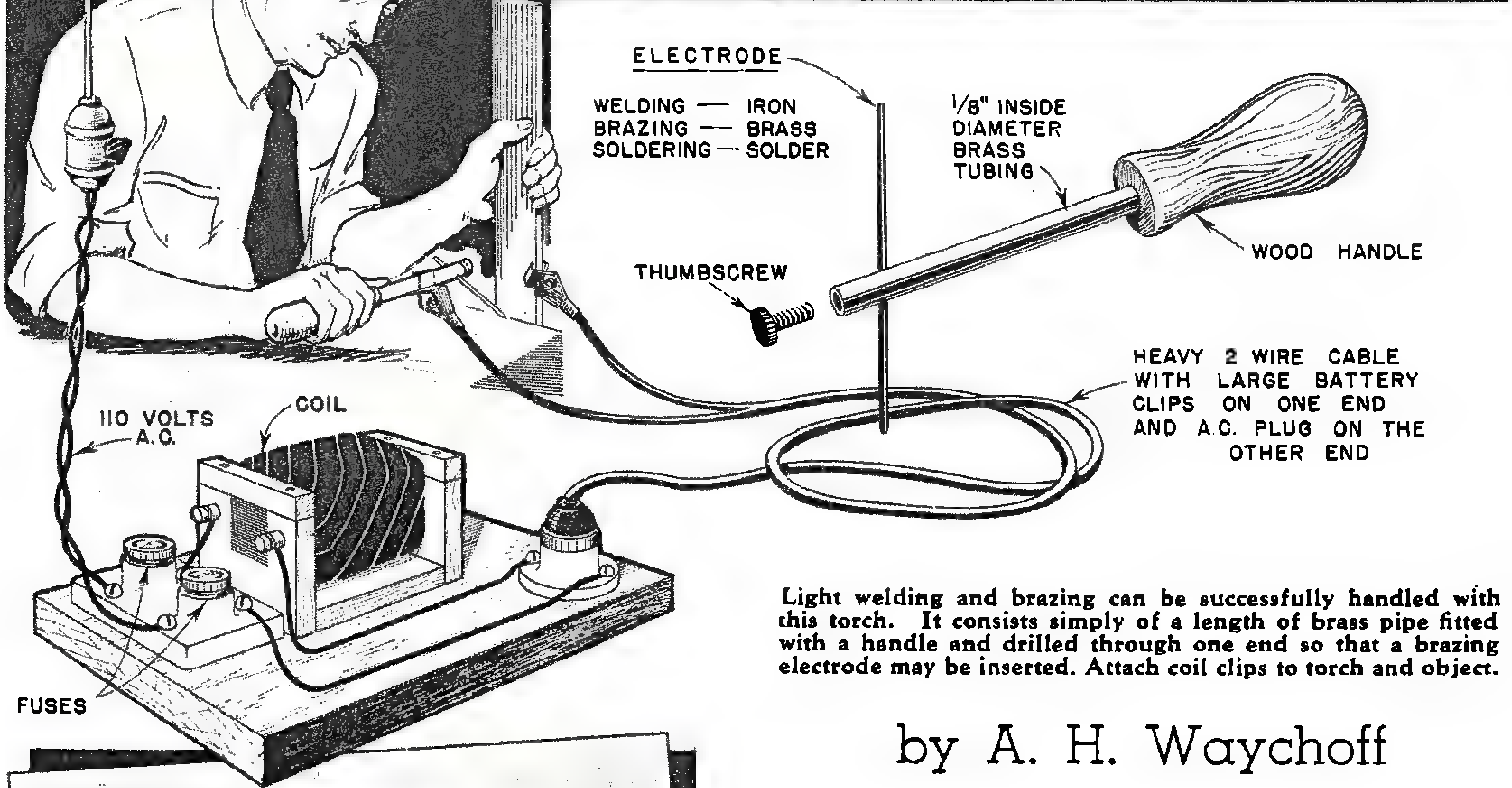
[*Continued on page* 134]


ANTENNA
50 MMF.
G
3 MEG.
.0001 MFD.
.00014 MFD.
.000015 MFD.
F1
F2
P
1
2
3
4
5
6
7
8
6J7 TUBE
R.F. CHOKE
.01 MFD.
.00025 MFD.
.5 MFD.
100,000 OHMS
700 H. CHOKE
750,000 OHMS
10 MFD.
1500 OHMS
12A7 TUBE
P
G
SG
K
H
H
RK
RP
PHONES OR SPEAKER
8 MFD.
14 MFD.
15 H. CHOKE
8 MFD.
330 OHMS
.01 MFD.
110 VOLTS
SWITCH



The more technically inclined radio experimenter will find this schematic diagram helpful. It corresponds with the pictorial diagram shown on opposite page.

EXPERIMENTING


ELECTRODE
WELDING — IRON
BRAZING — BRASS
SOLDERING — SOLDER
1/8" INSIDE DIAMETER BRASS TUBING
WOOD HANDLE
THUMBSCREW
HEAVY 2 WIRE CABLE WITH LARGE BATTERY CLIPS ON ONE END AND A.C. PLUG ON THE OTHER END
110 VOLTS A.C.
COIL
FUSES

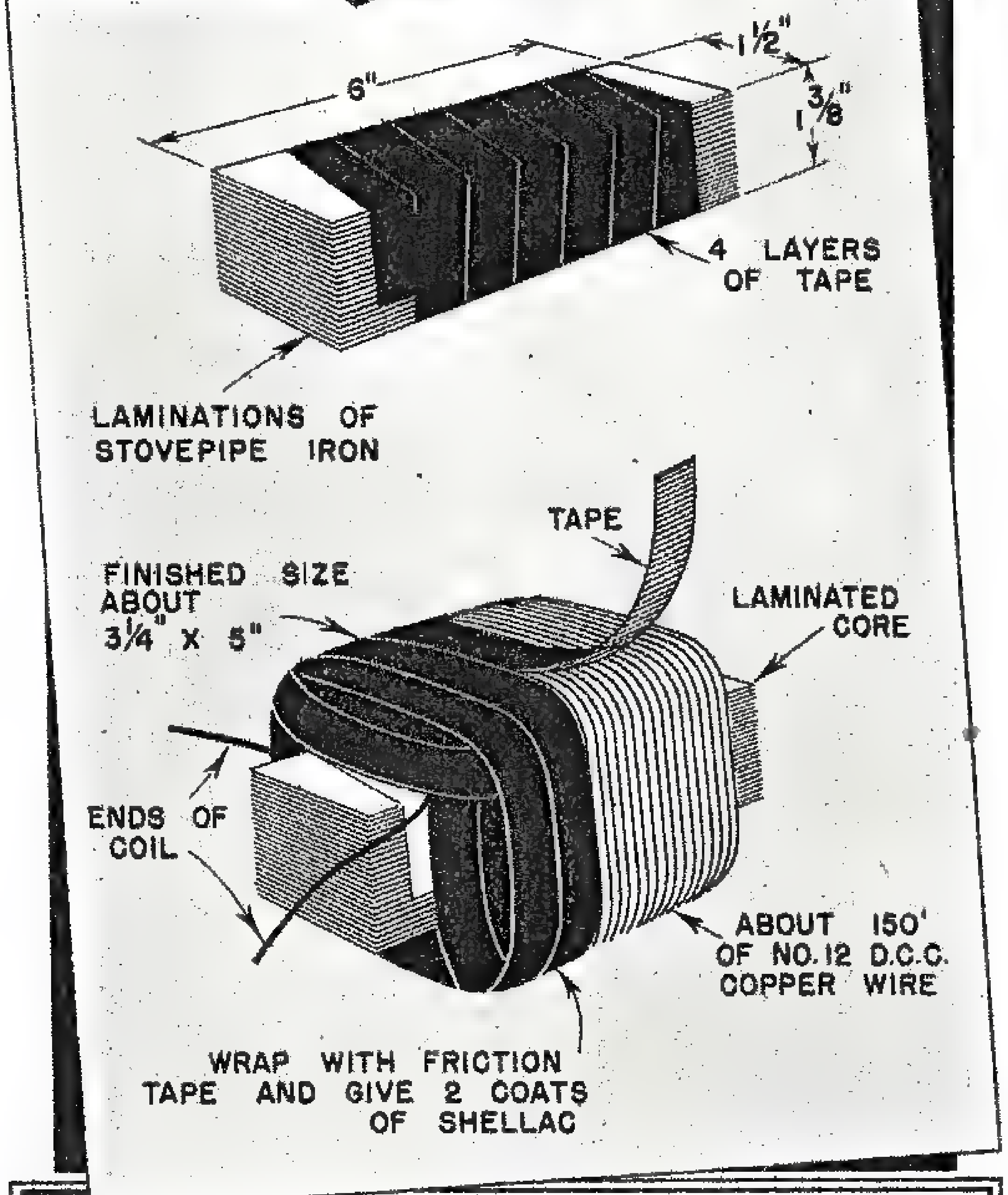
Light welding and brazing can be successfully handled with this torch. It consists simply of a length of brass pipe fitted with a handle and drilled through one end so that a brazing electrode may be inserted. Attach coil clips to torch and object.

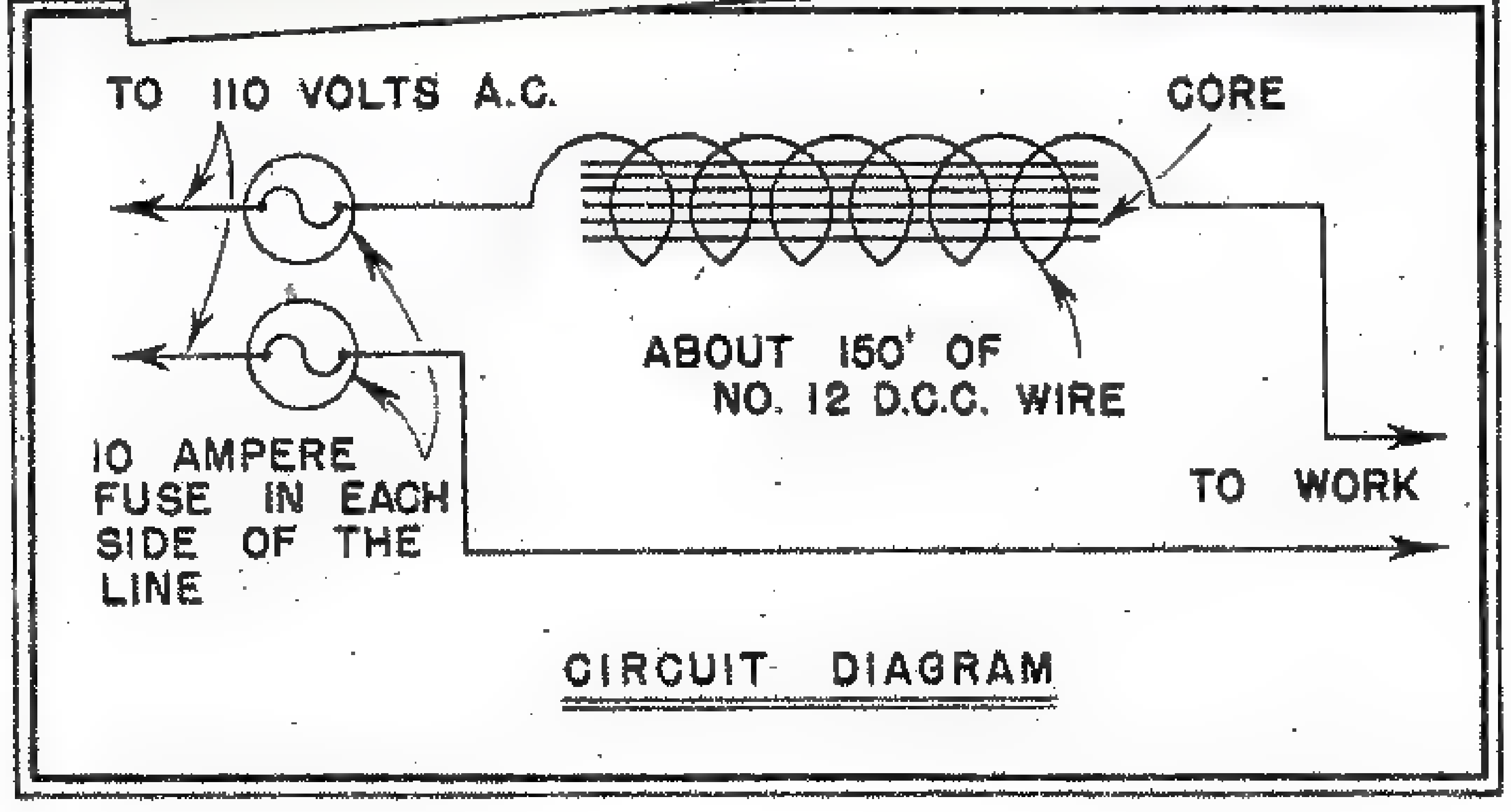
by A. H. Waychoff

EXPERIMENTING with black light, electric arc welding and molten metals are only a few of the many interesting experiments which you can perform if you own a reactance coil. The reactance coil, itself, is a simple piece of electrical apparatus which serves as an automatic current consumer permitting an electric arc to be produced from 110-volt house current without the usual blowing of fuses. Instead of the arcs producing a perfect short circuit as would be the case if connected directly to the 110-volt they are merely part of the series resistance circuit into which the reactance coil has been connected.

Before any experiments can be conducted it will be first necessary to construct the coil. Secure a sheet of black iron, commonly referred to as stovepipe iron and cut it into strips measuring 6" by 1½". Stack these up until the pile measures 1⅜" in thickness. About sixty to seventy strips will be required. Around the pile of iron strips wrap four layers of friction tape. The bound strips become the core for the reactance coil.

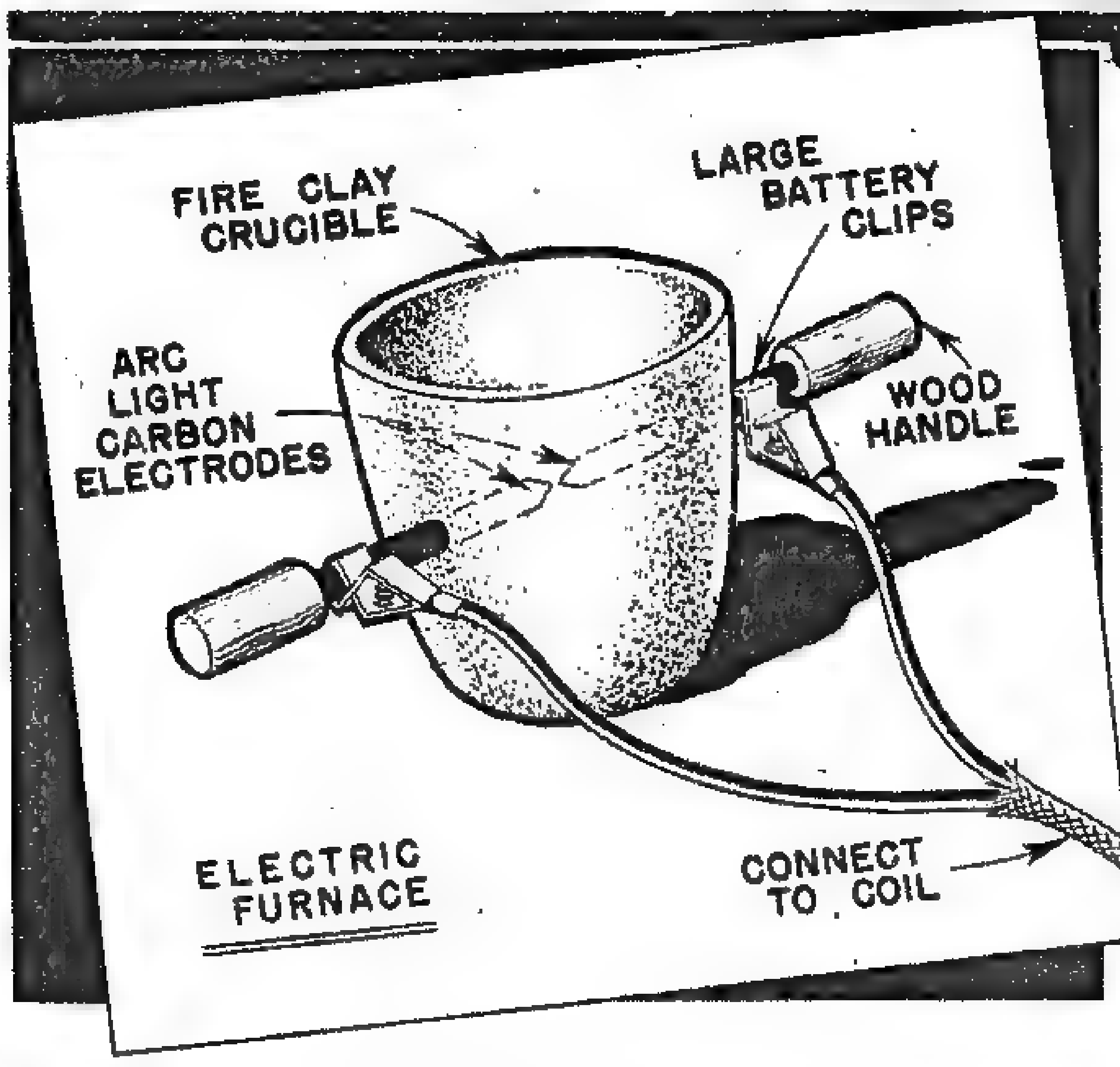
With the core completed you are ready to wind the coil. This consists of 150 feet of No. 12 double cotton covered copper wire.


6"
1½"
1⅜"
4 LAYERS OF TAPE
LAMINATIONS OF STOVEPIPE IRON
TAPE
FINISHED SIZE ABOUT 3¼" x 5"
LAMINATED CORE
ENDS OF COIL
ABOUT 150' OF NO. 12 D.C.C. COPPER WIRE
WRAP WITH FRICTION TAPE AND GIVE 2 COATS OF SHELLAC

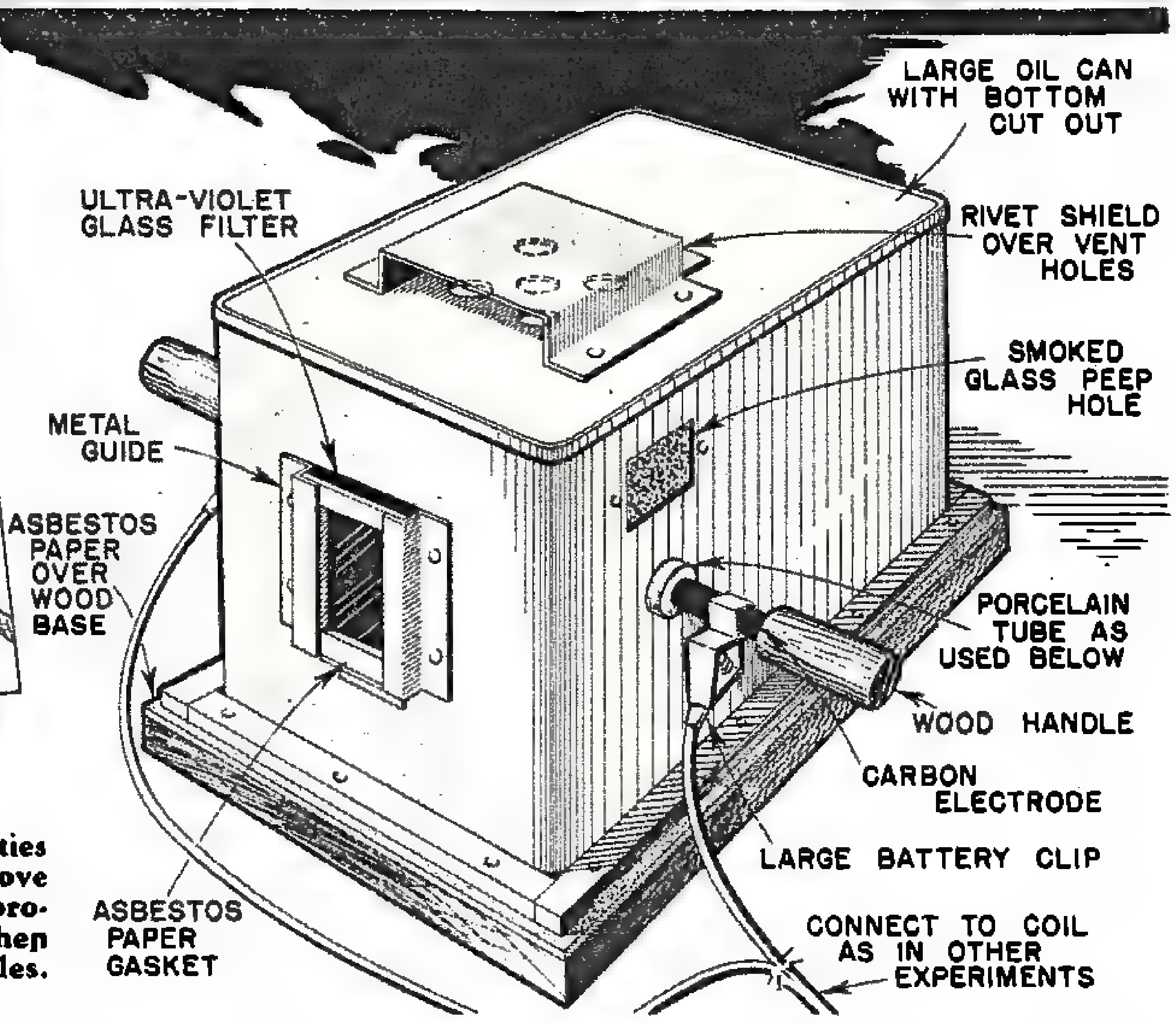

TO 110 VOLTS A.C.
CORE
ABOUT 150' OF NO. 12 D.C.C. WIRE
10 AMPERE FUSE IN EACH SIDE OF THE LINE
TO WORK
CIRCUIT DIAGRAM

The reactance coil is wound on a metal laminated core consisting of sixty to seventy 1½" x 6" strips of stovepipe iron. Over coil wind tape, following with 150' winding of No. 12 D.C.C. magnet wire. Schematic diagram of the coil is shown at left.

WITH A REACTANCE COIL


FIRE CLAY CRUCIBLE
LARGE BATTERY CLIPS
ARC LIGHT CARBON ELECTRODES
WOOD HANDLE
ELECTRIC FURNACE
CONNECT TO COIL

A handy electric furnace for melting small quantities of metal can be constructed as described in the above illustration. Mould the crucible from fire clay providing holes for inserting arc light carbons. When experimenting with furnace wear dark sun goggles.


LARGE OIL CAN WITH BOTTOM CUT OUT
ULTRA-VIOLET GLASS FILTER
RIVET SHIELD OVER VENT HOLES
SMOKED GLASS PEEP HOLE
METAL GUIDE
ASBESTOS PAPER OVER WOOD BASE
PORCELAIN TUBE AS USED BELOW
WOOD HANDLE
CARBON ELECTRODE
LARGE BATTERY CLIP
ASBESTOS PAPER GASKET
CONNECT TO COIL AS IN OTHER EXPERIMENTS

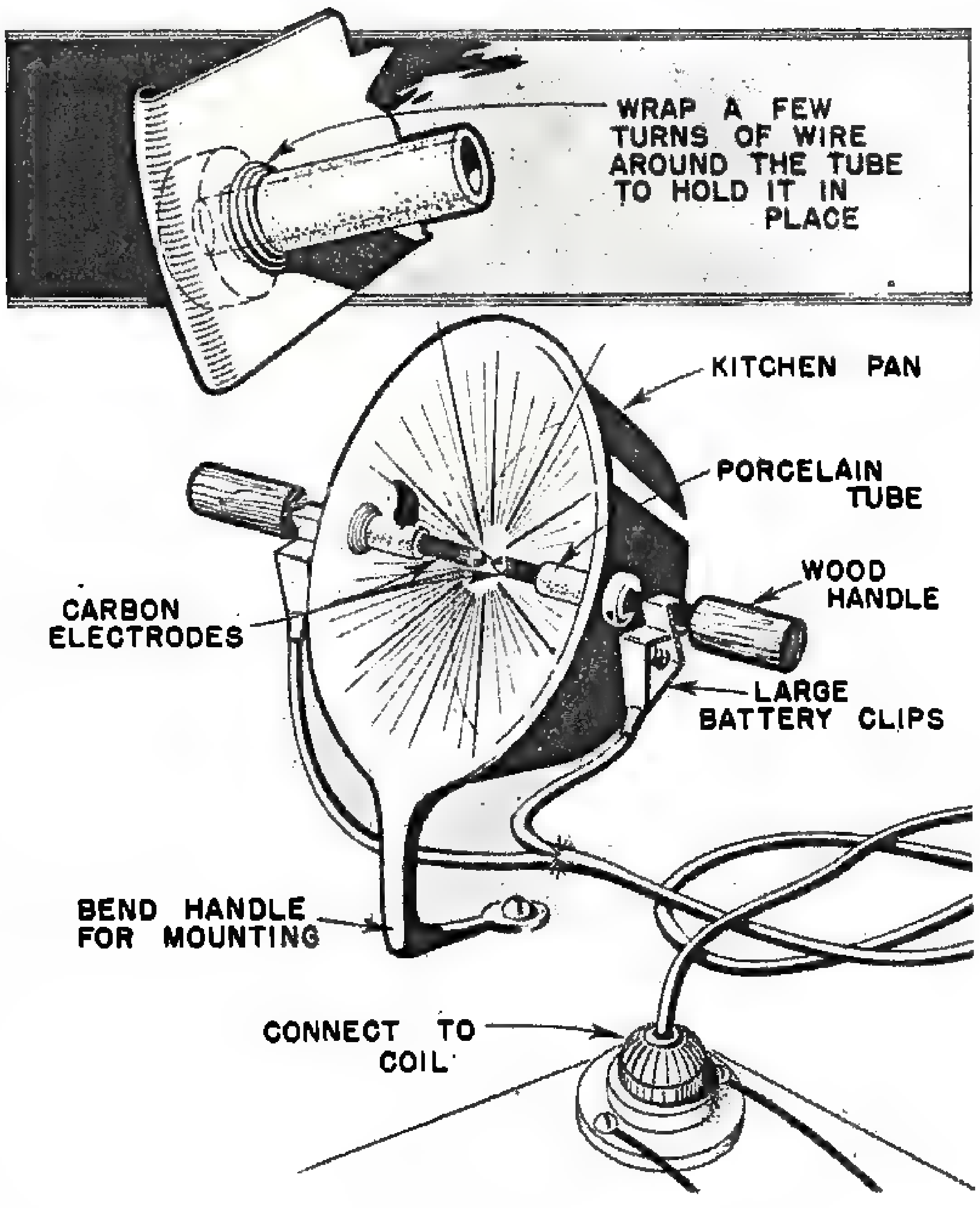
This ultra violet ray lamp reveals forged signatures, invisible inks and invisible acid etchings in metals. Fashion the lamp from a 5-gal. oil can mounted on an asbestos covered wooden base. A window holds a small pane of ultra violet filter glass through which the invisible rays pass. Carbon rods furnish arc.

Wind the wire over the metal core in uniform layers then bind the coil with several layers of friction tape. To seal the coil from moisture paint it with several coats of shellac, but be careful not to paint the core or metal strips on which the coil is wound.

After the shellac has dried the coil can be mounted on a suitable wooden base along with a double fuse block which provides for the installation of two 10 ampere fuses. These provide additional overload safety when using the coil. A porcelain cleat socket is also attached to the base permitting a flexible heavy duty rubber covered fixture cord to be attached. Battery clips attached to the opposite ends of the cable allows connections to be made to the carbon electrodes.

Connected to a welding torch the reactance coil permits anyone to do light brazing, soldering or welding. A satisfactory welding torch can be made from a length of brass tubing having an inside diameter of 1/8". A hole is drilled through the end of the coil for the brazing electrodes. A thumbscrew holds the electrodes securely in place. A large wooden file handle attached to the opposite end of the tubing completes the torch. To use simply connect one of the battery clips attached to the reactance coil cable to the torch and connect the other clip to the work to be welded. It is always advisable to wear

[*Continued on page* 134]


WRAP A FEW TURNS OF WIRE AROUND THE TUBE TO HOLD IT IN PLACE
KITCHEN PAN
PORCELAIN TUBE
WOOD HANDLE
CARBON ELECTRODES
LARGE BATTERY CLIPS
BEND HANDLE FOR MOUNTING
CONNECT TO COIL

A pair of carbon electrodes or rods of 3/8" diameter connected to the reactance coil and fitted in a reflector similar to the one shown here make a powerful spotlight. Porcelain insulators such as used in house wiring insulate carbons from reflectors.

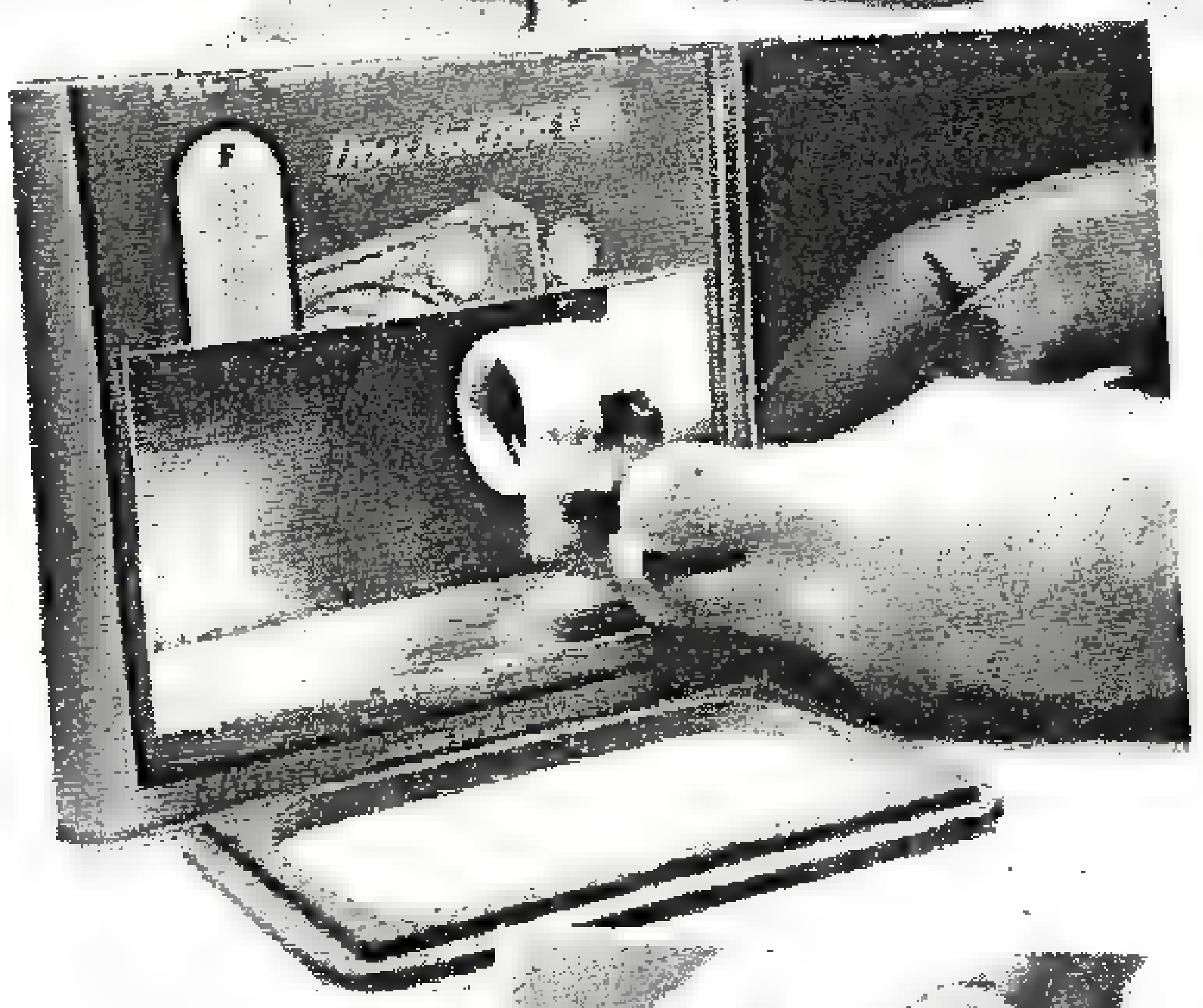
Make This "Tin Can" Amateur Photo Printer

FOR an investment of less than fifty cents you can construct an efficient photo printer capable of doing work as speedily as many commercial printers. The foundation unit of the printer can be picked up at any garage for it is nothing more than a one-gallon oil or anti-freeze can measuring 6¾" by 4¼" by 9½". Besides the can you will need only a length of fixture cord, a porcelain socket, two small hinges, a hardwood board measuring 5½" by 8¼" by ⅝" and several pieces of plywood.

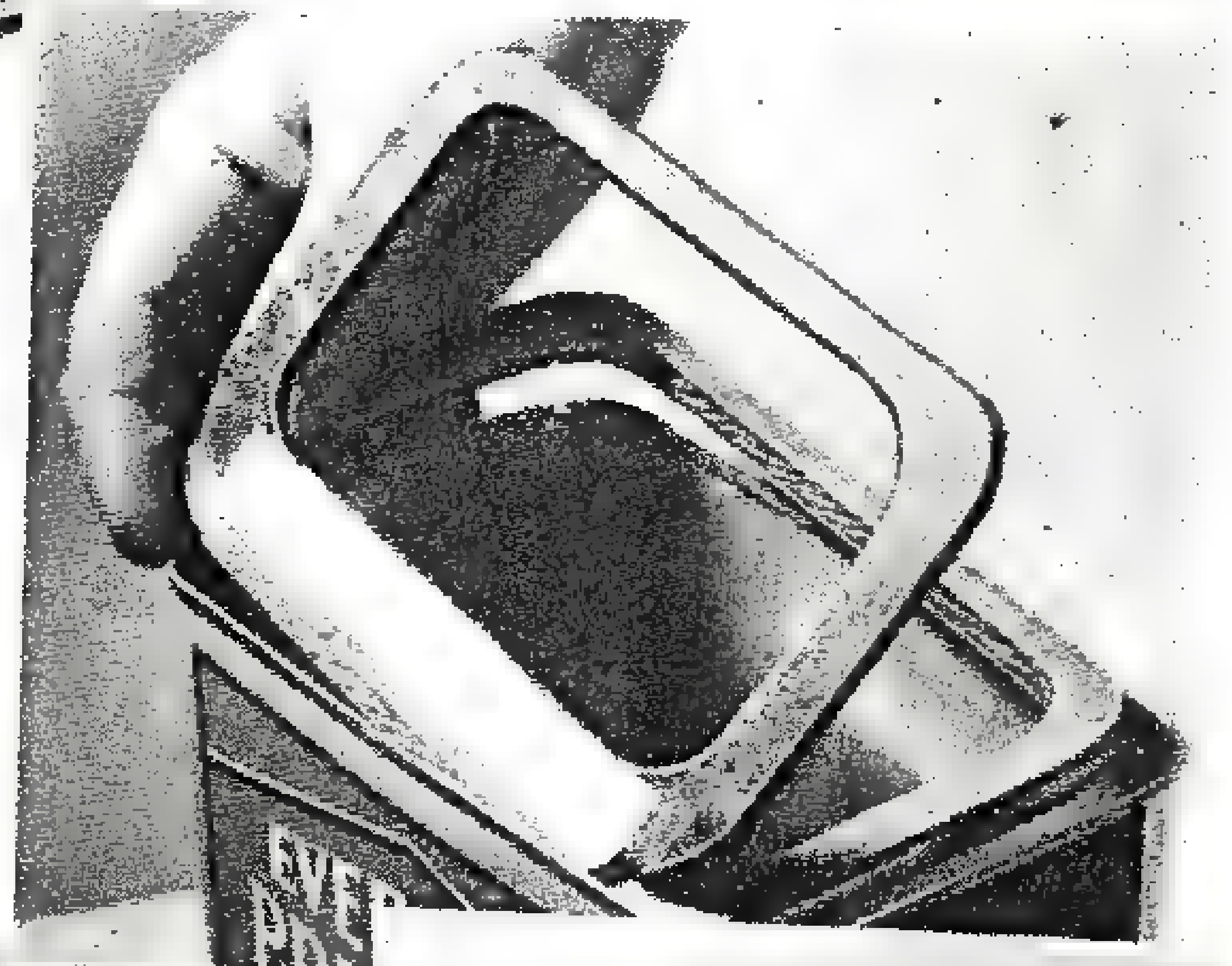
With a pair of tin snips cut off the top of the can inside the seam. In the side of the can cut a 3" by 5" opening for the safelight window and after completing this paint the outside of the can with asphalt varnish. The inside of the can should be left "as is" since the bright tin serves as a reflector.

After the varnish has dried install the porcelain socket, drill a small hole for the fixture wire and insert in it a rubber bushing to protect the wire from fraying. Halfway in the can mount a plywood frame for the safelight mechanism. The operation of this device is simple. Over the frame installed in the center of the can mount a slightly smaller frame pasting a sheet of deep yellow colored paper over it. Hinge the small frame to the larger one with a strip of cloth tape, attaching a length of cord to the frame so that it passes through a small eyelet in the side of the can. By pulling the cord the yellow paper filter is automatically raised to furnish white light

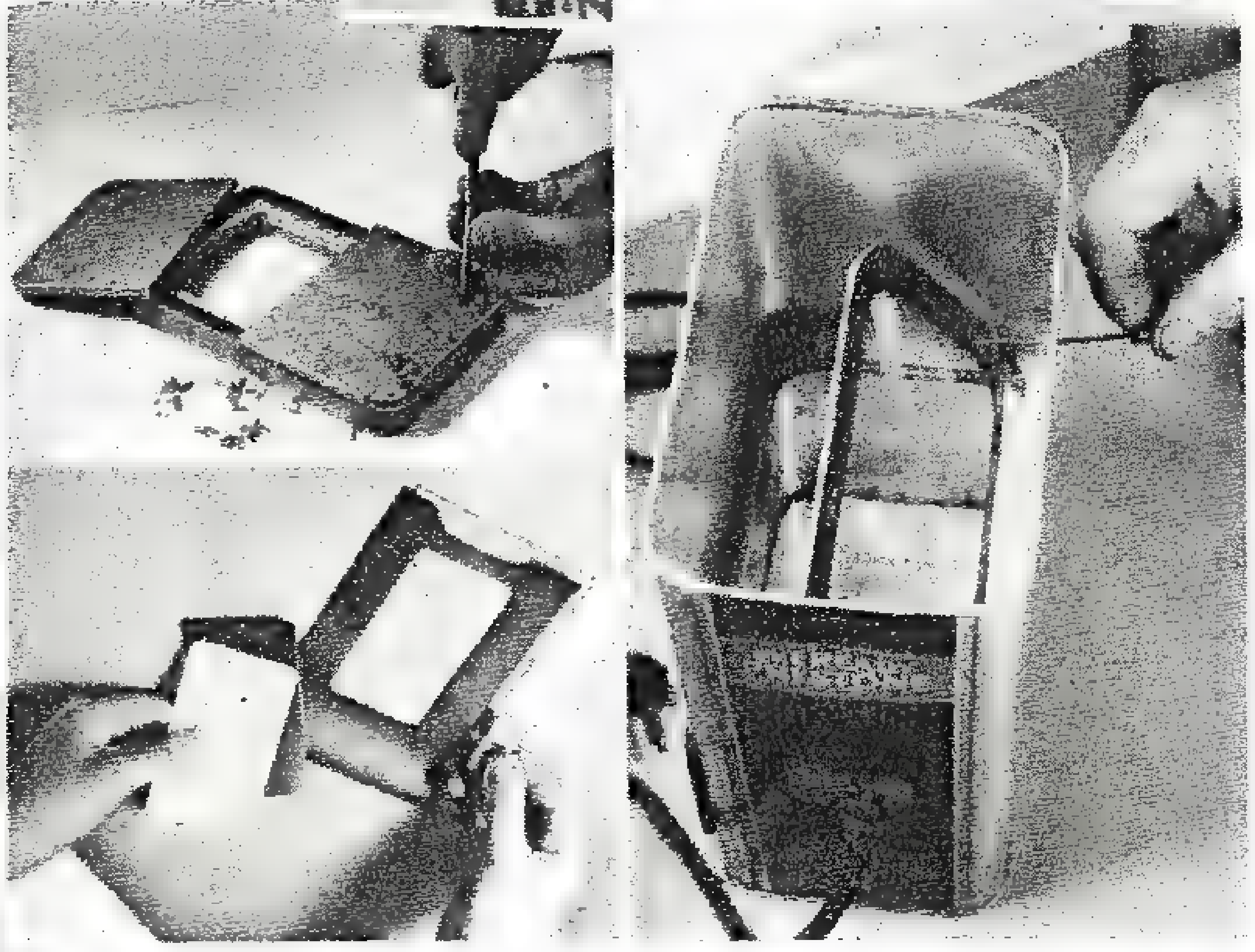
[*Continued on page* 128]



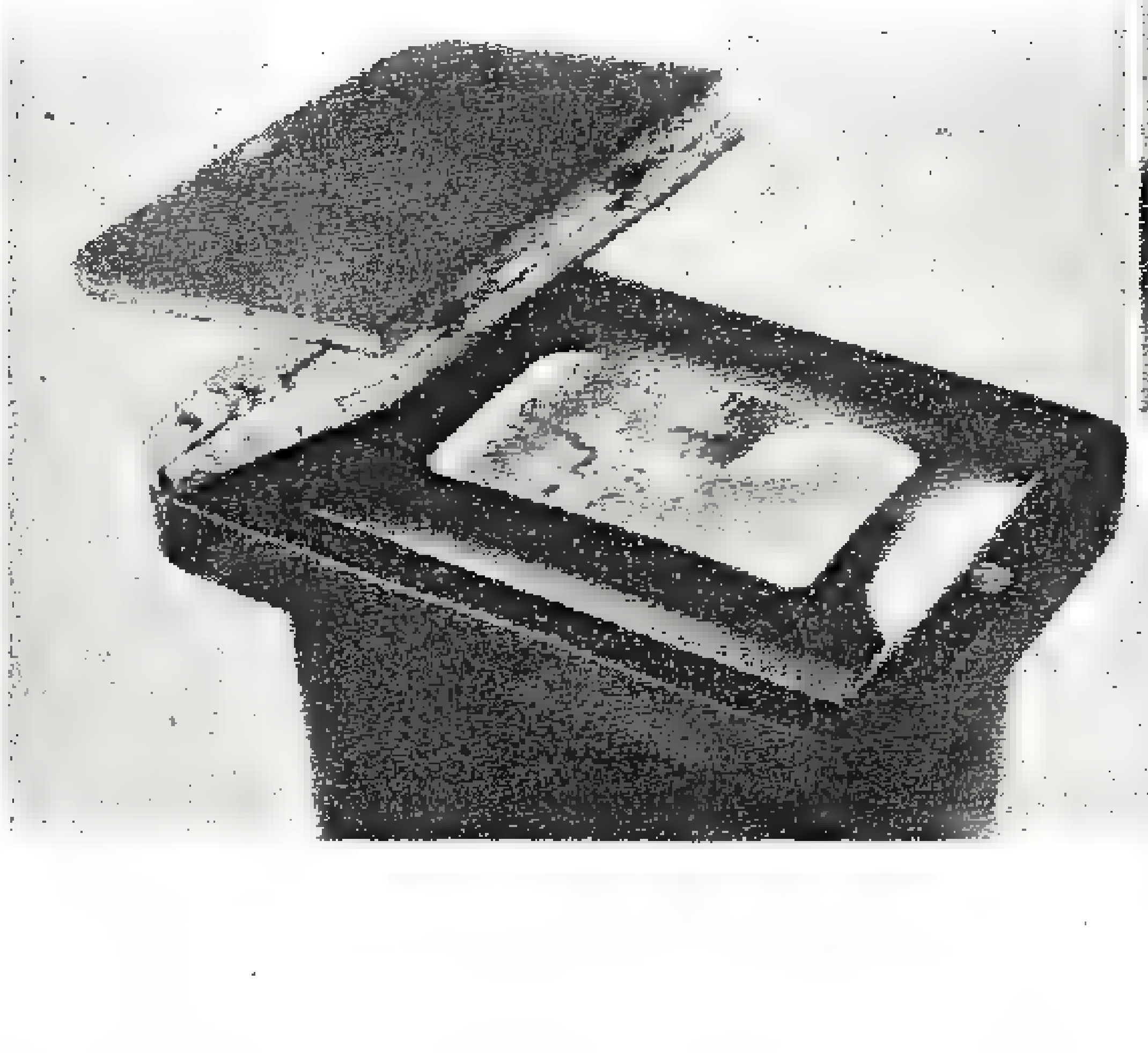
This practical photo printer was constructed from a one-gallon oil can at a cost of less than 50c. It does work equal to that done by professional printers. Left—After cutting a safe-light opening in the side of the can install the light socket.



Cut from two pieces of plywood hinged frames, at right, are installed half way inside the can. Yellow filter paper is attached to the smaller frame.



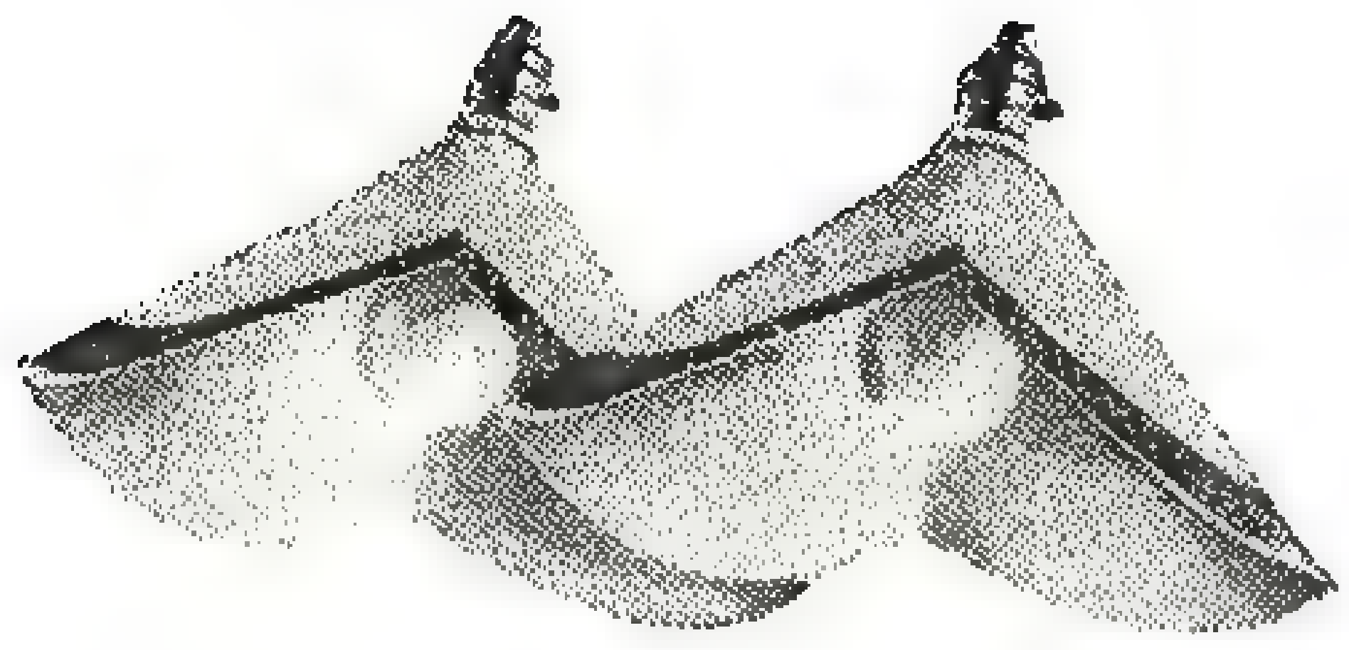
The photo at right shows the simple manner in which the yellow filter frame operates. Pulling the cord raises the frame and allows white light to pass through. The photo at upper left shows assembly of platen. Lower photo shows paper negative mask over glass.



Completed printing platen is shown at right with a negative mounted over the printing glass. The plywood backing is hinged in two places and dark felt glued to the back to provide a light tight surface.

Page 116 Missing.

Kodak
Super Sensitive
Panchromatic



Load your camera with Kodak "SS" Film

①

Use two or three Photoflood Lamps and Reflectors

②

All you do to make snapshots at NIGHT

HERE'S GOOD NEWS for every camera fan who's keen to get snapshots at night, but hasn't had a fast enough lens.

Now, even a simple Brownie makes snapshots (instantaneous pictures) indoors after dark.

Just use Kodak "SS" Film, and two or three of the new No. 2 Mazda Photoflood lamps, which last for hours, and Model B Kodak Handy Reflectors.

If your camera has an *f*.6.3 or faster lens, No. 1 Photoflood lamps are powerful enough.

FREE BOOKLET... Contains all you need to know about ***both kinds*** of night pictures —***snapshots*** with Photoflood lamps, ***fast exposures*** with Photoflash lamps. (You can use Photoflash lamps, each good for one picture, if your camera can be set for "time.") The booklet's pictures and diagrams show how to arrange your lights . . . how to place your subject . . . and it even suggests a variety of picture opportunities. Get a copy at your dealer's . . . Eastman Kodak Co., Rochester, N. Y.

How you can take
SNAPSHOTS
INDOORS AT NIGHT
WITH ANY CAMERA

Fighting Oil Well Fires

[*Continued from page* 61]

ways. Sometimes heavy tools, while being drawn out or, in some instances, blown from the well, create sparks as they bang against the casing pipe. Lightning may strike a well. But the exact cause is seldom known. Most who have been close enough to see the actual cause, have been killed.

A trained expert with special equipment is required to put out these wild torches. Kinley's usual method is to set off a charge of gelatinized nitroglycerin at the base of the blaze. It may be days before the shot can be fired at some fires. Red hot metal and debris first must be pulled out, away from the well. If not removed, this hot metal can easily re-ignite the gas.

Kinley's method, like the fire, is spectacular; but he is decidedly not a stunt man. He goes about his work with the careful strategy of a general in the midst of war. His work is war—a patient battle with Nature gone wild.

He has developed a system which includes a special fire truck, unique equipment and the help of trained assistants. Much of the equipment he designed, based on practical experience and needs, for he is mechanically inclined and has invented many practical devices in the oil fields. When he needs something that can do the job better he says he "just makes it."

He employs a five-man crew to clear away the debris. Two wear heavy asbestos suits, helmets, gloves and shoes, and work up close to the fire, rushing in and out of the terrific heat attaching grappling hooks to the hot metals. The hooks are connected by steel cables to a powerful high speed tractor, manned by a third member of the crew. Two more assistants, standing behind a movable shield, play a double stream of water over the ground near the mouth of the well and over the men working in the asbestos suits. Occasionally bad valves have to be yanked out "by the roots." No two fires are the same.

Finally comes the task of carrying the "gelatin" to the edge of the flame. Kinley prepares his own shot at his nitro wagon stationed a mile away from the well. He can estimate the size of the shot needed, which may range from five to 40 quarts, packed in a metal container of a special design with double walls with air space between, and wrapped with a layer of heavy asbestos. Every precaution is taken to protect the shot from the heat. Attached to the container is a strand of wire, used in firing the charge from the switch.

A final check on the equipment, and Kinley climbs into his asbestos suit, signals the hose crew, and starts toward the roaring flame in a leisurely walk, carefully picking his way over the muddy ground. Tucked under his arm is enough explosive to blow him to smithereens should he miss footing or the trailing wire snag and jerk the container from his grasp.

YOU HAVEN'T A CHANCE, SIS JIM HATES GIRLS!
THANKS SO MUCH - YOU'RE JIM GREENE AREN'T YOU? I'VE HEARD MY BROTHER BOB TALK ABOUT YOU LOTS. WHY DON'T YOU EVER COME OVER WITH THE REST OF THE CROWD?
OH - I - ER I COULDN'T - THAT IS YOU SEE - I'M - ER - I'M NO GO AT SOCIAL STUFF
WELL, WELL, MISS CLEOPATRA, DIDN'T GET FAR THAT TIME - DID YOU?
H'MM - BOB, I BET I KNOW WHY HE ACTS STAND-OFFISH. IT'S HIS FACE. ALL THOSE PIMPLES. WHY DON'T YOU TELL HIM ABOUT FLEISCHMANN'S YEAST? YOU KNOW HOW IT HELPED YOU!

As though discussing some ordinary job, Kinley modestly admits:

"I have had narrow escapes. One never knows in this business. A wind might whip the flames around and then it's all over."

At the mouth of the well Kinley places the shot within a foot or two of the blaze and quickly retires to the switch 100 yards back. Down goes the plunger. A dull red glow appears near the fire. As sight is quicker than sound, the yellow flame disappears in the air a fraction of a second before the explosion is heard. However, the roar of the gas continues, for, when the force of the shot is dissipated the gas resumes its upward flow. But there is no fire. Kinley's work is not completed until he has connected the well with pipe lines or storage tanks, putting it in production.

All conceivable equipment is carried in the fire truck. A special pump for spraying the men and cooling the ground is mounted on the front of the motor. Other equipment consists of special nozzles and hose; several sets of asbestos suits, shoes and gloves; hardboiled helmets with heat-resisting glass windows; gas masks, inhalators, stretchers, first aid supplies, a complete set of specially designed non-sparking and heat-resisting tools, and oil-soaked cotton for the men to plug in their ears as a protection against the roar, vibration and explosion.

Because of the spectacle value of a burning oil well and the interest in Kinley's success, he recently gave a public demonstration at the International Petroleum Exposition at Tulsa. Natural gas was piped to an 80-foot wooden derrick in front of the grandstand.

To increase the pressure sufficient to produce a 60-foot blaze, gate valves on the open flow gas wells 60 miles away were opened. The normal gas flow on the main line is 25 pounds, reduced at the domestic meter to 4 ounces, or one-quarter pound. Opening the valves increased the main line pressure to 100 pounds, at which pressure it was delivered to the exhibition. The demonstration, lasting a little more than an hour, consumed 1,155,000 cubic feet of gas, or enough to supply the needs of ten homes for a year; the cost was about $1,000.

Prior to the adoption of Kinley's method of fighting fires, the most successful method was to smother the blaze with jets of steam and streams of mud. This system is still used on some blazes.

"What was the biggest single shot you ever used?" Kinley was asked.

"Eighty quarts," he replied. "That was on the big Tulsa Oil Company fire at Overton, Texas. The next biggest was about 45 quarts on the Sinclair Oil Company fire at Gladewater."

"Which was the hardest to handle?"

"They were both plenty tough. The gas pressure was so strong on the Overton blaze that the

[*Continued on page* 143]

—JIM'S PIMPLY FACE MADE HIM BALKY ABOUT GOING PLACES
READ STORY
THAT GUY'S A REGULAR HERMIT I TELL YOU — JUST STICKS AROUND BY HIMSELF — WOULDN'T TAKE A GIRL OUT ON A BET...
IS THAT SO — WELL I'LL BET I CAN BREAK HIM DOWN. YOU WATCH—
NOT HURT ARE YOU — HERE — YOU'D BETTER LET ME HELP YOU OVER TO THE BANK
OOOH-OUCH-MERCY I JUST C-CAN'T SEEM TO S-STAND UP ON THESE SKATES!

LATER
HERE-TRY THIS ONE!
WHO SAID JIM DOESN'T LIKE GIRLS?
O.K. SIS — I'LL EAT MY WORDS. YOU AND THOSE YEAST CAKES SURE HAVE WORKED WONDERS. JIM'S A NEW GUY SINCE THOSE PIMPLES LEFT HIM!

Don't let Adolescent Pimples keep YOU from making new friends

● Countless boys and girls shun company and avoid "dates," because they hate to be seen with a pimply face.

After the start of adolescence—from about 13 to 25, or even longer—important glands develop and final growth takes place. The whole body is disturbed. The skin gets oversensitive. Waste poisons in the blood irritate this sensitive skin. Pimples result.

Fleischmann's fresh Yeast is helping thousands of young people to overcome adolescent pimples. It clears these skin irritants out of the blood. Pimples go. Eat 3 cakes daily —one before each meal— plain, or dissolved in a little water—until skin clears. Start today!

—clears the skin

by clearing skin irritants out of the blood

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$195.
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A Twin
CYLINDER
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JUNIOR SCOUT

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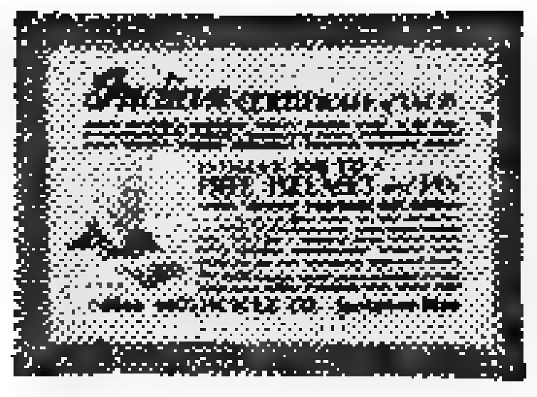
The new Indian Junior Scout is easy to handle—starts with the kick of the starter—packs plenty of power and pep to whizz you along up with the leaders. And it's as economical to run as it is to buy. You'll get 70 miles to the gallon easily.

Why wait? Enjoy the fun and thrills of soaring over the open road on your own motorcycle. Visit your Indian dealer today. Look at this magnificent engineering triumph. Your dealer will tell you how easy it is to buy the Junior Scout, or any of the many other Indian models, on easy payments and how you can get a fine RIDER'S HELMET and INDIAN PIN absolutely FREE when you order.

FREE



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☐ 16-19 years
☐ 20-30 years
☐ 31 years and up
☐ under 16 years

INDIAN MOTOCYCLE CO., *Springfield, Mass.*

Fly Fishing

[*Continued from page* 87]

nually hied to by fishermen from greater New York, Philadelphia, Washington and Baltimore. There are many other streams in Pennsylvania that offer increasingly good trout fishing as time goes on. There are also excellent trout streams in both Virginia and West Virginia. In these last two states the best four wet flies, highest in preference, are the Queen of the Waters, the Brown Hackle, the Coachman and the White Miller. A check among anglers in Pennsylvania, New Jersey and Delaware brought out the fact that most of the anglers picked these five wet flies as their most killing patterns: Queen of the Waters, Coachman, Cow Dung, Grizzly King and Silver Doctor.

While the trout season opens early in the East, in the sections given, the middle West including Michigan, Wisconsin, Minnesota, etc., sees cold weather hanging on much longer, to the extent that it is not before May that fishing for the speckled ones is under way. Bait fishing is largely practiced in the streams of these states, probably more so during the early season than in any other section of the country. Choice stand-bys in the wet fly list for Michigan are the Coachman, Professor, the various Hackles and the Yellow May. Minnesota wet flies that seem to be preferred over others are the Brown Hackle, Montreal, Queen of the Waters, the Black Gnat and the Professor. The same applies to Wisconsin streams and lakes.

The eastern angler who brings a copious flybook along with him into the West finds in short order that he will be using few eastern flies.

Western trout fishing may be divided into three classes: the valley trout, mid-altitude trout and the high altitude trout. Of these three, the lowland trout, or those taken from the stream as it passes through the valleys, are the easiest appealed to, and are likewise the largest in size.

Mid-altitude trout are generally trout of comparatively fast water. They are medium-sized trout, superlatively strong from fighting a fast current. The best fishing occurs in the pools where the large ones always hang out.

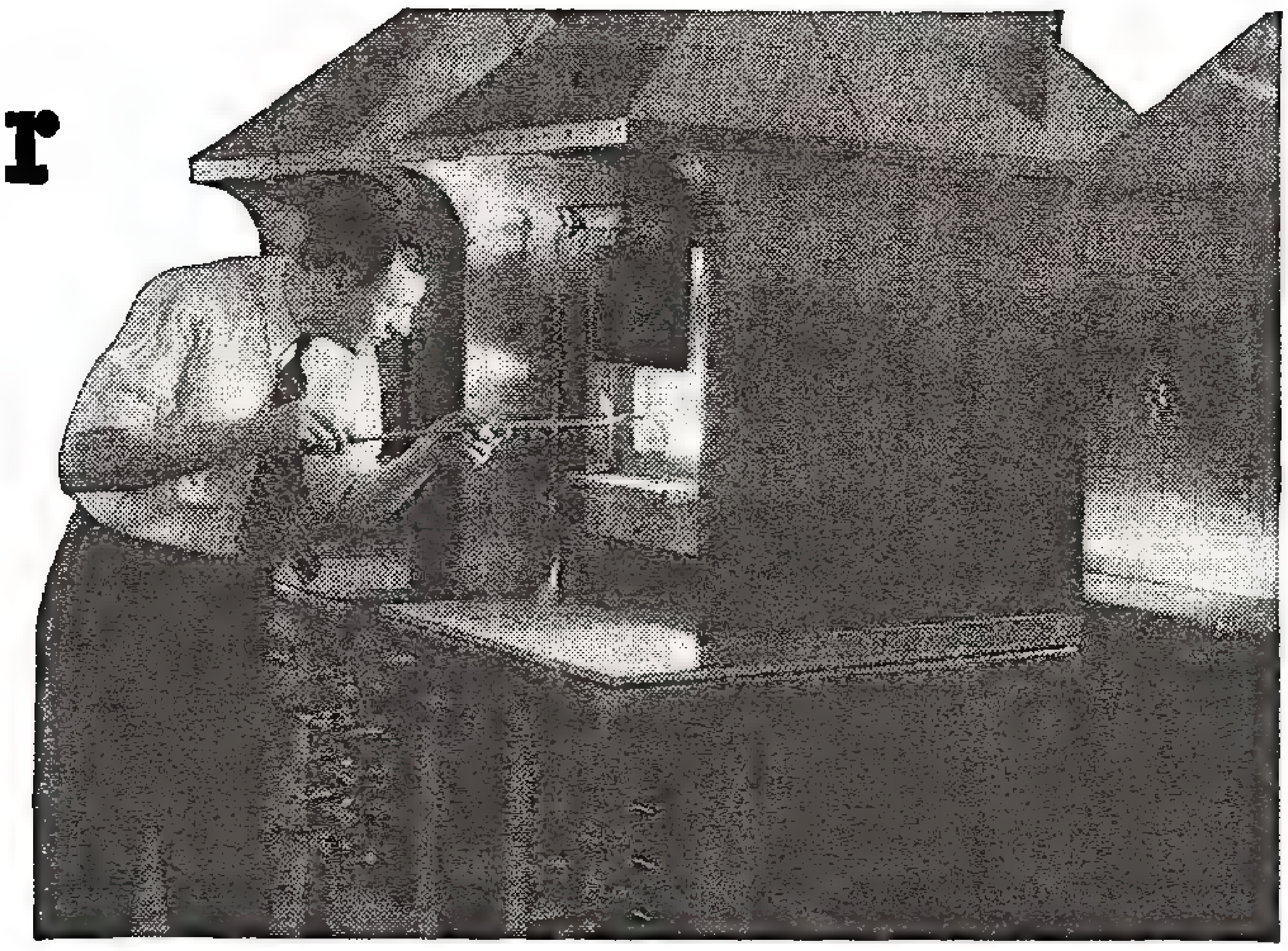
High altitude trout are a different proposition altogether. Here we are likely to find trout mature at six to eight or ten inches in length, the same subsisting on small flies and like aquatic food in minute proportions. Here the water will be found to be clear as crystal and the trout at times wary as a result. No heavy trout tackle is used in the high altitudes.

Among the famous Oregon streams is the Rogue River, a typical steelhead stream. In the Rogue, as in all the large streams flowing into the Pacific, one often lets out 50 to 100 feet of line, to take the lure down with the current.

Not all steelhead-rainbow trout streams are as large and demand as heavy tackle as those in Oregon, British Columbia and Alaska. For average fishing a 5 ounce rod fly-rod and automatic reel is recommended.

t. s. = 200 000 #/□"

No Wonder GENUINE FORD SPRINGS STAND UP!

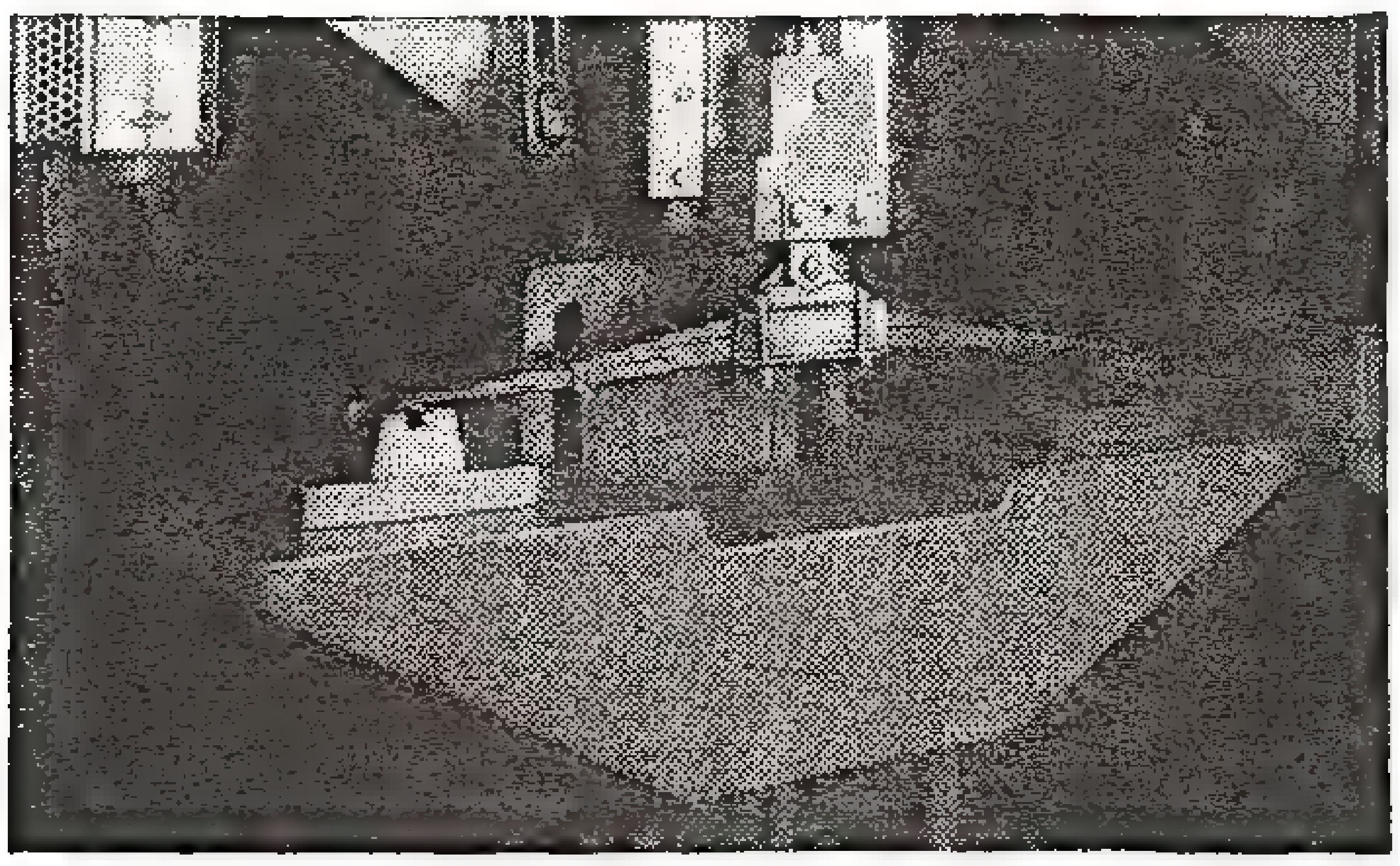


Two HUNDRED THOUSAND pounds per square inch! That's the tensile strength of the steel in a Genuine Ford Spring. It's an example of the standards of quality to which Genuine Ford Springs are built.

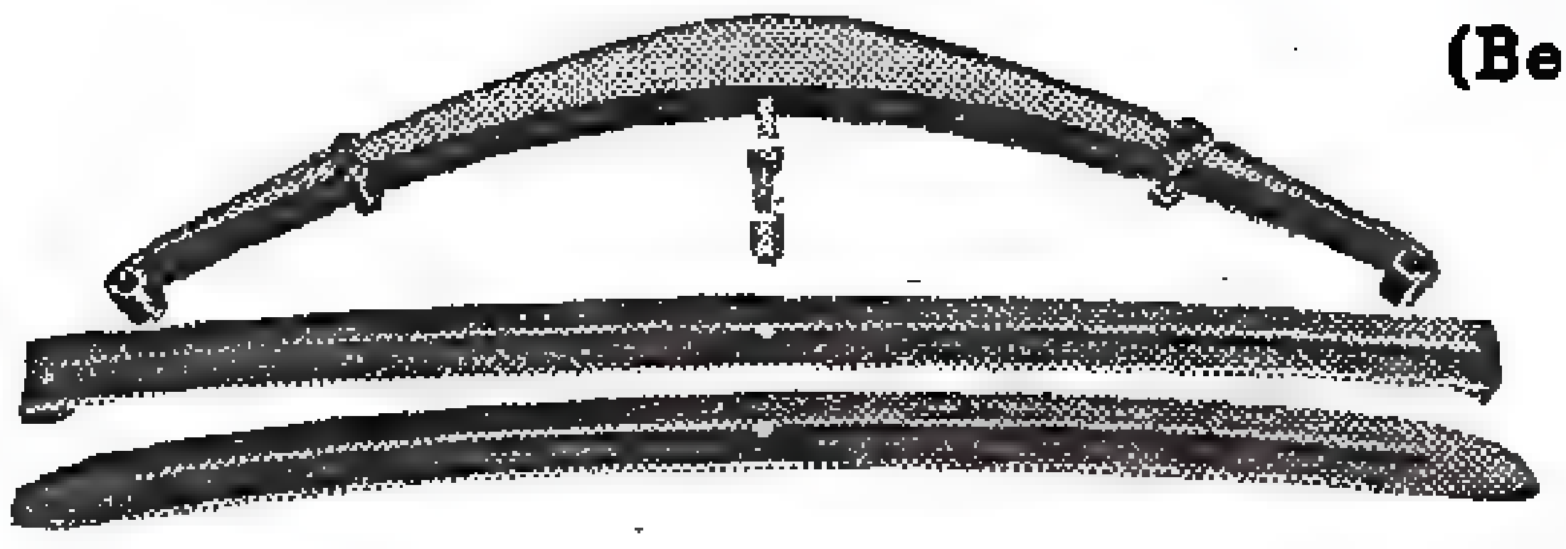
Every batch of steel used in making Ford Springs is carefully analyzed. It must meet rigid specifications established by Ford engineers. Only a high-grade oil-hardened chromium steel is used.

Test springs made up of leaves from the various batches of steel are being constantly subjected to rigorous tests on one of five machines built exclusively for spring testing. And an example of the precision used in manufacturing Genuine Ford Springs is the fact that the inside diameter of spring eyes is held within limits of two thousandths of an inch.

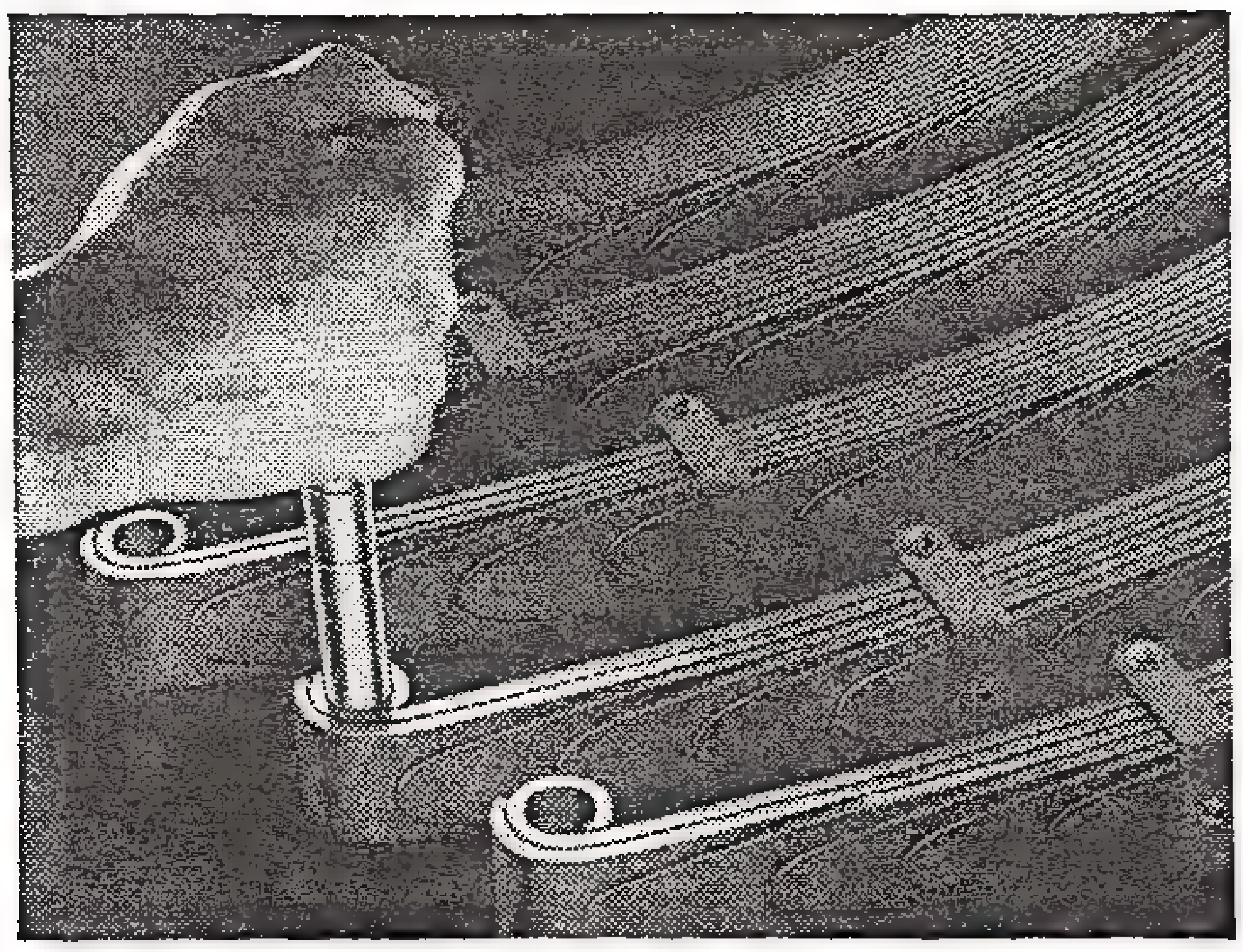
Quality materials, uniformity of materials, precision manufacture, rigid tests and careful inspections — these are the things that insure Ford quality in Genuine Ford Springs as well as all other Genuine Ford Parts. These are the things that mean you get full value when you buy Genuine Ford Parts.



(Above) Heating steel sample in electric furnace at Ford Testing Laboratories. (Below) Fatigue Test equivalent to more than 10 years of usual service.



Springs for 1937 Ford V-8s are provided with an oil groove for interleaf lubrication as shown at left.



Plug gage inspection of Ford Spring eyes.

FORD MOTOR COMPANY

DEARBORN • MICHIGAN

OH! for a SNAPSHOT NOW!

TAKE IT.. easily with G-E MAZDA Photo lamps

Haven't you often wished for a picture of some precious indoor scene, such as that above? Get out your camera and take it now, day or night, with G-E MAZDA Photo lamps.

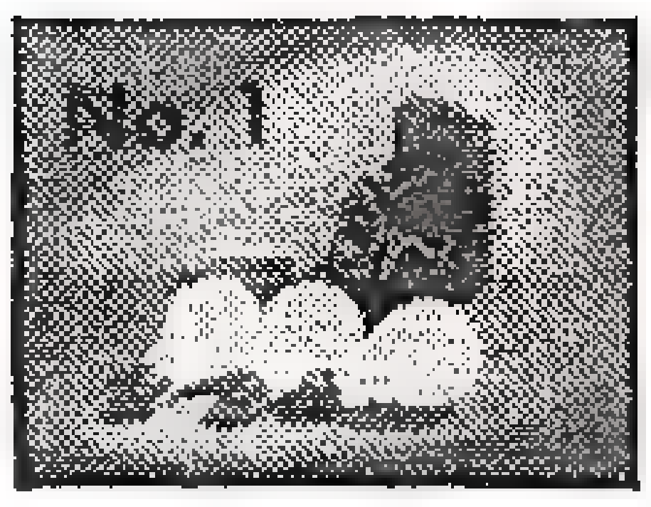
It's easy. *If your camera has a fast lens*—F/6.3 or faster—use supersensitive film and G-E MAZDA Photoflood lamps No. 1. Good for dozens of pictures. 25 cents list.

If your camera has a slow lens, open it wide, use supersensitive film and G-E MAZDA Photoflood lamps No. 2. Twice the light, three times the life. 50 cents list.

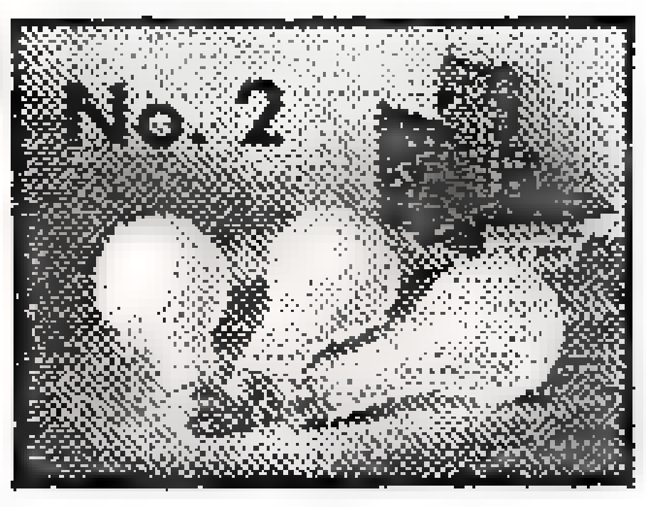
Here's What You Need

Put two G-E MAZDA Photoflood lamps in A and one in B. Place the lamps at the distances indicated. Tip shades to concentrate the light or use inexpensive paper reflectors. Then click the shutter as for a snapshot outdoors.

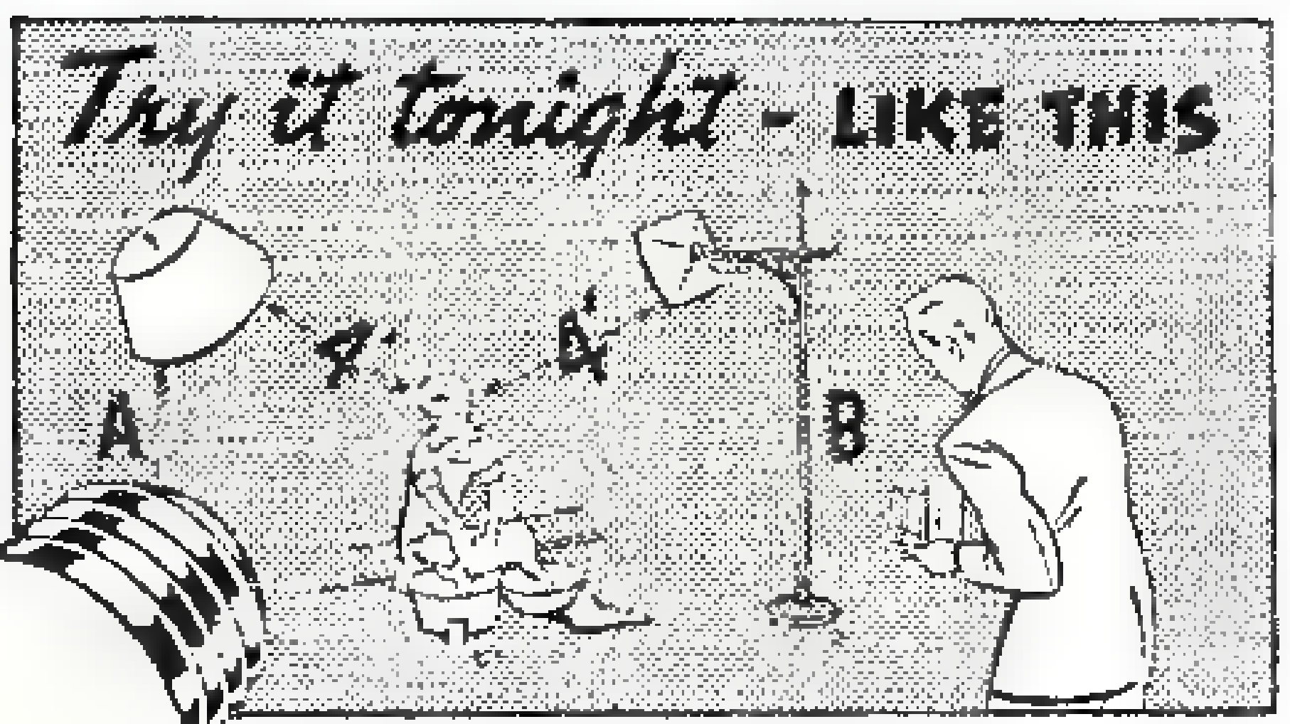
FOR ACTION SHOTS, or with a box camera, use G-E MAZDA Photo*flash* lamps. Each lamp gets one picture. 15 cents list. Your drug store or camera dealer can supply you.



For Fast Cameras



For Slow Cameras


Try it tonight - LIKE THIS
4'
4'
A
B

FOR PICTURES AT NIGHT

FREE FOLDER

Send for "How to Snap Pictures at Night." Write General Electric Co., Cleveland, Ohio.

LOOK FOR THE MARK

for dependable light for picture-taking

GENERAL ELECTRIC
MAZDA PHOTO LAMPS

Make Sportsman's Pack Rack

[*Continued from page* 99]

and laced on the inside, making a comfortable cushion for the wearer's back. Buttonholes should be made for the screw-eyes to pass through so that the canvas will not unravel.

The carrying straps should be about 1½ inches wide; narrower ones would cut into the shoulders under full load. Woven fabric is best and they are attached as in the accompanying illustrations. Each strap should be equipped with a buckle for adjustment and a snap so that they can be removed when necessary.

The small screw-eyes on the side members are for lacing the duffle to the rack. A canvas pack-sack can be made or purchased to fit on the frame. This rack can easily be swung from the shoulders and rested against a tree or boulder, the brass caps preventing injury to the ends of the side members.

A pack rack such as the one just described can be easily constructed by any sportsman or outdoorsman in a single evening. Its designer, Robin Hansen of Haines, Alaska, found it ideal for use on ski trips into the north country.

A Modern Desk Typewriter

[*Continued from page* 98]

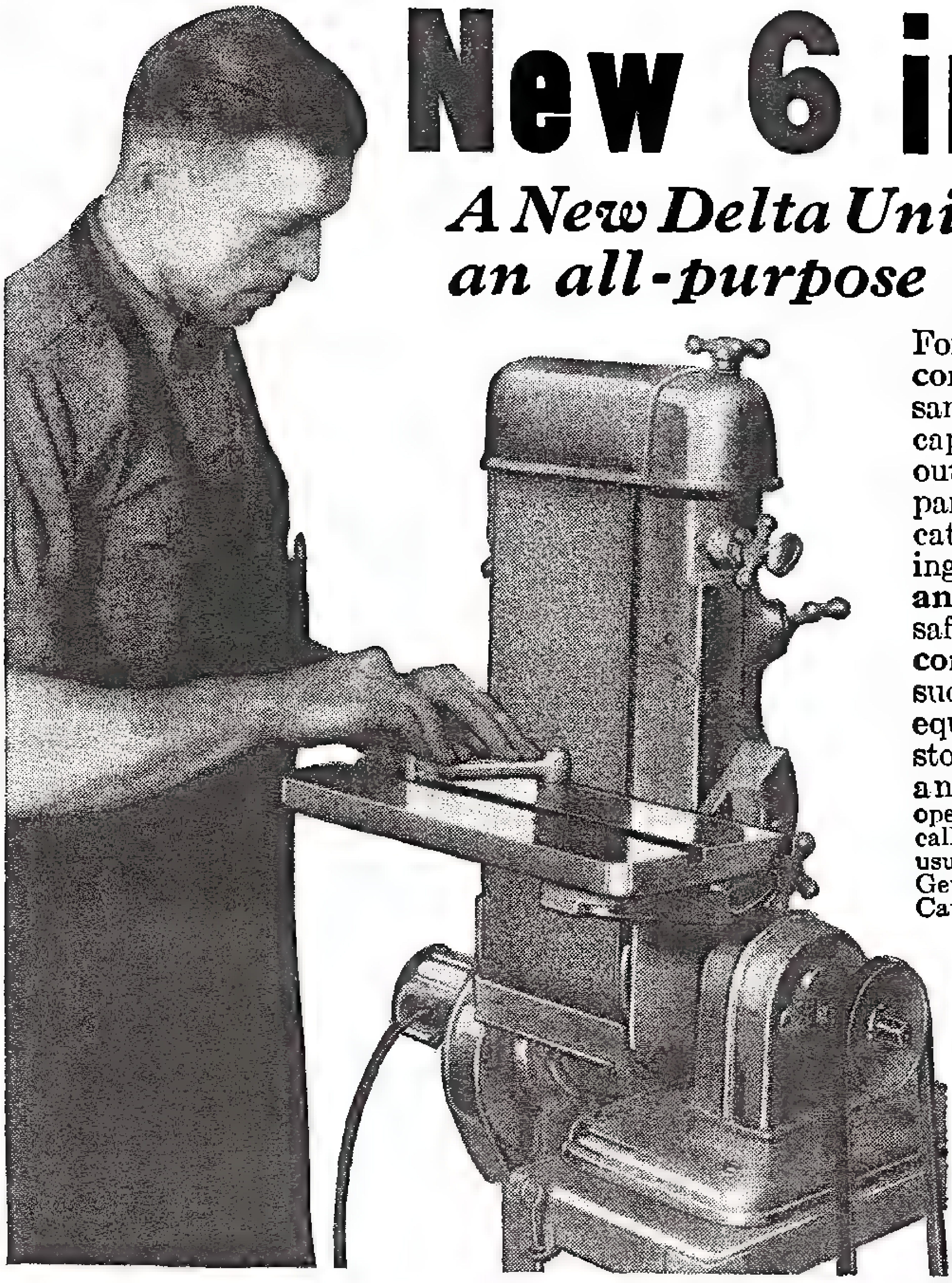
corners to permit the drawer to pull out. When the drawer itself is made lay this board in it, and fit the sliding strips to the shelf sides. Screw these strips on with flat headed screws from the outside. Fit the drawer into its intended space and put your machine on the board. Pull the typewriter shelf out to the best position for yourself. Then place regular sash fasteners to the sides to hold the shelf steady. Mark a line on the bottom showing the position of the typewriter board. About an inch toward the shelf front attach several hidden spring buttons. Fit the catch on the under side of the sliding board, so the spring button will catch when the board is pulled out.

The utility drawer pictured in Figure 9 is no different than any other drawer and is easily assembled. The stationery drawer described in Figure 7 has several special features. It is built so the drawer will pull out and then twist sideways so that the stationery is right at your finger tips. This is accomplished by fastening a rod near the back and at the side of the drawer, which isn't as wide as the space allotted. At the front of the desk two band iron hooks catch the rod and the drawer swings out on them. The drawer is built around the bottom piece. Assemble the right side piece (which really is the back piece when the drawer is swung into position), the back and the main partition but not the front. The paper shelves fit between the main partition and the back and are supported on small strips. Room is provided on the top piece for small compartments suitable for holding clips and pencils.

[*Continued on page* 151]

New 6 in. Sander

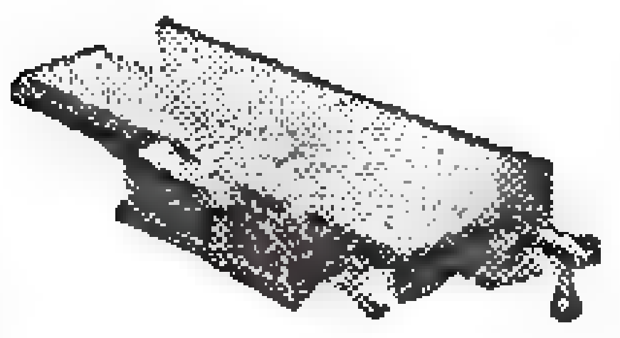
A New Delta Unit—The last word in an all-purpose surfacing machine

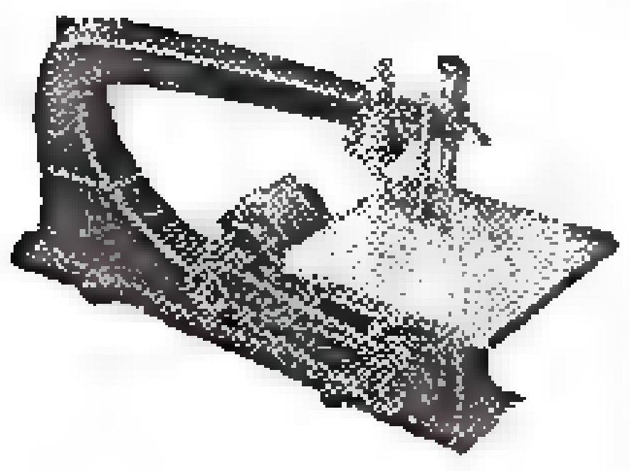


For the first time—here is a **correctly engineered** belt sander and finisher of 6-inch capacity. Equipped throughout with self-sealed New Departure ball bearings lubricated for the life of the bearing. **Completely enclosed and guarded,** which means safety and permits practically **complete** removal of dust by suction system. May be equipped with a fence, back stop or tilting table to suit any sanding or finishing operation. May be operated vertically or horizontally. Priced unusually low for such fine quality. Get the full story in the New Delta Catalog.

Complete Line of Efficient Low-Cost Tools

Be sure to see ALL the new Delta tools: the revolutionary new 17″ Drill Presses, new precision 4″ Jointer and 11″ Drill Press, new 10″ Band Saw and improved 14″ Drill Presses and 14″ Band Saw, in addition to many new and improved accessories.





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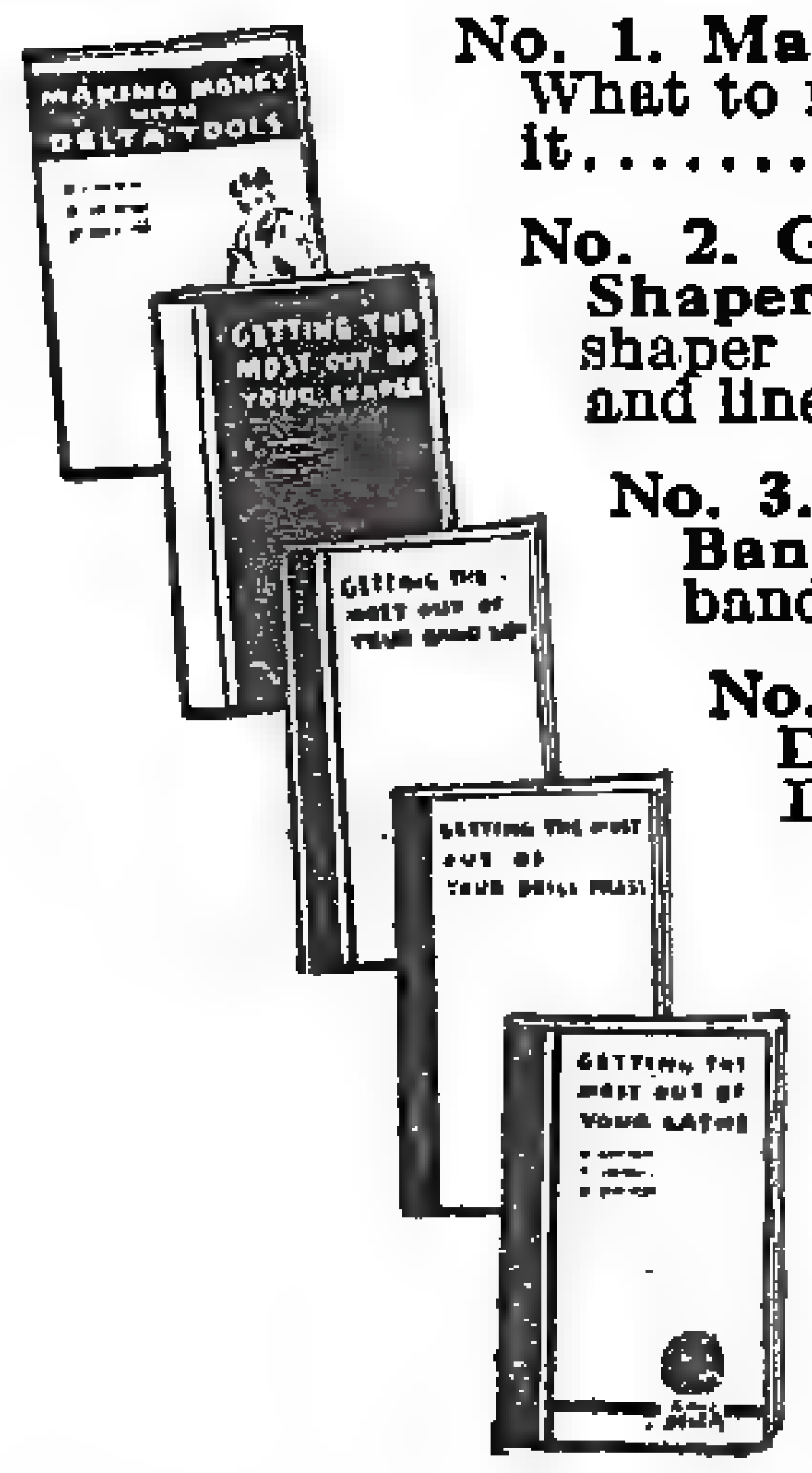
It is crowded with interesting illustrations and descriptions of the complete Delta line. Points out in detail the important features of Delta design. And also the new 32-page book No. 3 of "Practical Delta Projects" crowded with new and "out of the ordinary" things to make—with many photographs, working drawings, and easy-to-understand illustrations. Simple, complete instructions make every project easy to follow. Every craftsman should have this book. Send 10c with coupon for Delta Project Book No. 3. 1937 Delta catalog mailed postpaid.

New Practical Instruction Books

Up-to-the-minute, carefully written, liberally illustrated with especially prepared photographs and diagrams, easy to understand and thoroughly practical.



- **No. 1. Making Money with Delta Tools**—What to make, how to make it, where to sell it........10c ☐
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PHOTOGRAPHIC HEADQUARTERS since 1899

Bob-sled Gives Winter Thrills

[*Continued from page* 92]

the fabric disk and draw it down firmly to the block. The other two holes in the disk receive bolts which pass through two holes in the floor flange. This, in turn, is brazed or welded to the end of the steering shaft. The steering shaft is held rigidly erect at all times by being enclosed in a housing made of a length of 1½" pipe and a floor flange mounted on the top of the chassis board. The fitting of the universal joint will be simple to anyone with a knowledge of automobile construction. A short length of 1½" pipe serves as a spacing washer to elevate the top of the chassis board.

The rear runners are identical in basic construction to the front runners, except that they are fitted with spring cradles instead of universal fittings. Figure 4 covers these details. The pair of spring leaves used must be of heavy stock, at least $\frac{3}{16}$"x2". If, after the bobsled is completed, it is found to be too "rocky," an additional short spring leaf may be added to the suspension. The end bolt holding the leaf to the chassis board must be very strong, at least ⅝". The other hole should not be larger than ¼". The loop end of the spring leaves must be fitted with suitable bushes to receive the ½" cross-rod snugly.

And there is your bob-sled!

Many builders, however, will wish to modernize their sleds. A few suggestions along this line are offered in Figure 1. The "air-flow" front and the torpedo stern can be shaped from 26-gauge galvanized iron. *Roll all edges.* Never have a sharp, exposed edge on a bob-sled.

Hand-holds may be desired and these can be made with ¼" sash-cord passed through holes in the side boards as shown in Figure 2. The ends are knotted and drawn back against the holes. A brake on the bob-sled is a desirable feature and this can be achieved by suspending lengths of heavy log-chain in such a manner that they can be released by the pilot and will fall beneath the runners of the rear sled. These will stop the bob-sled within a reasonable distance, but must not be depended upon for an emergency stop.

Although this bob-sled incorporates every factor for safety in the construction it is up to the pilot to live up to the "Safety First" motto. A bob-sled in the hands of an indiscreet pilot is a mighty perilous vehicle. Be cautious! Try out any grade in graduated stages instead of starting at the top for the first trip. And remember that the same grade is much faster when the snow is melting than when the temperature is below freezing point.

In constructing the sled be sure to use good workmanship throughout. This is important not only from the standpoint of safety, but for durability as well. If your bob-sled is to carry ten adults it must be rigidly built.

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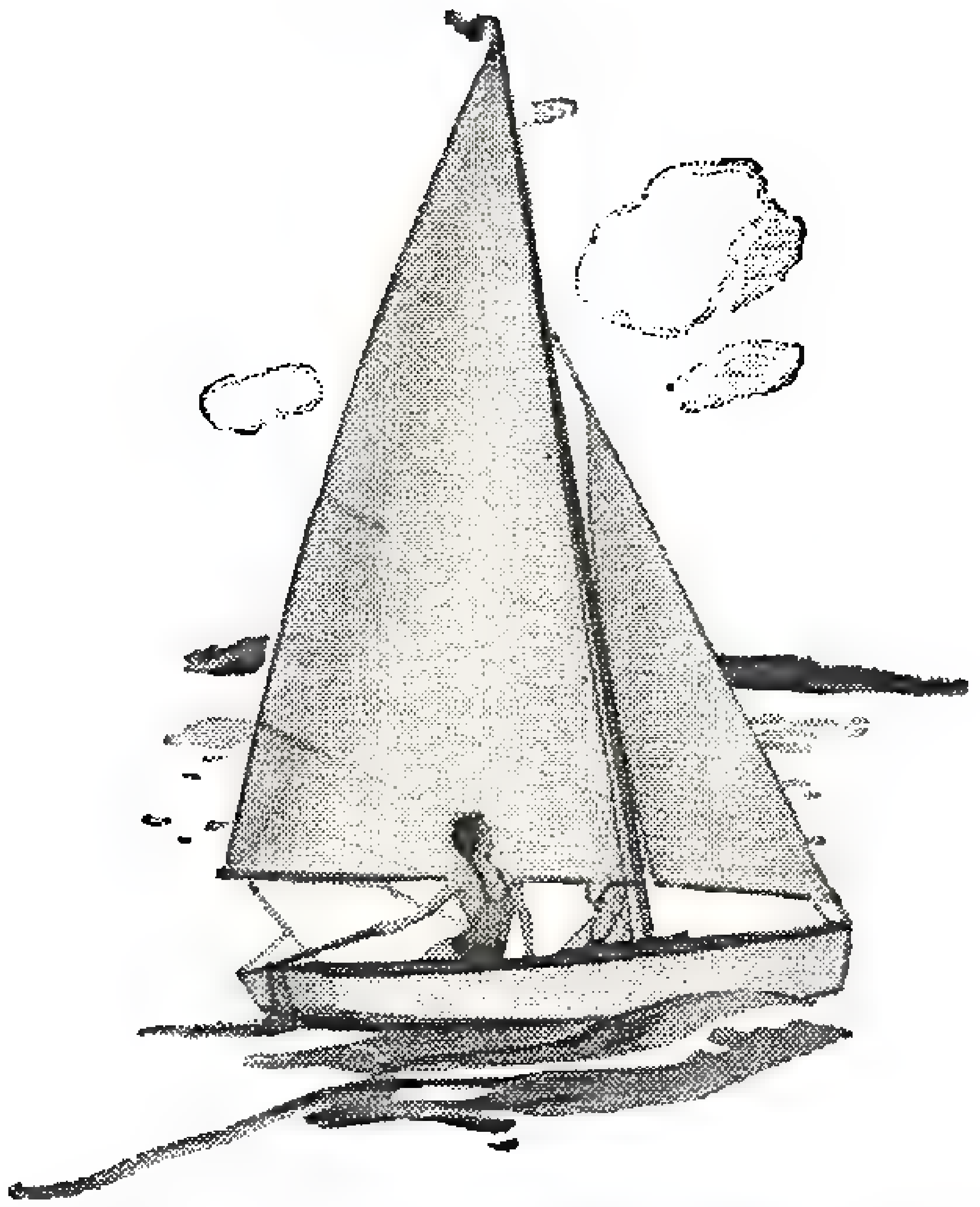

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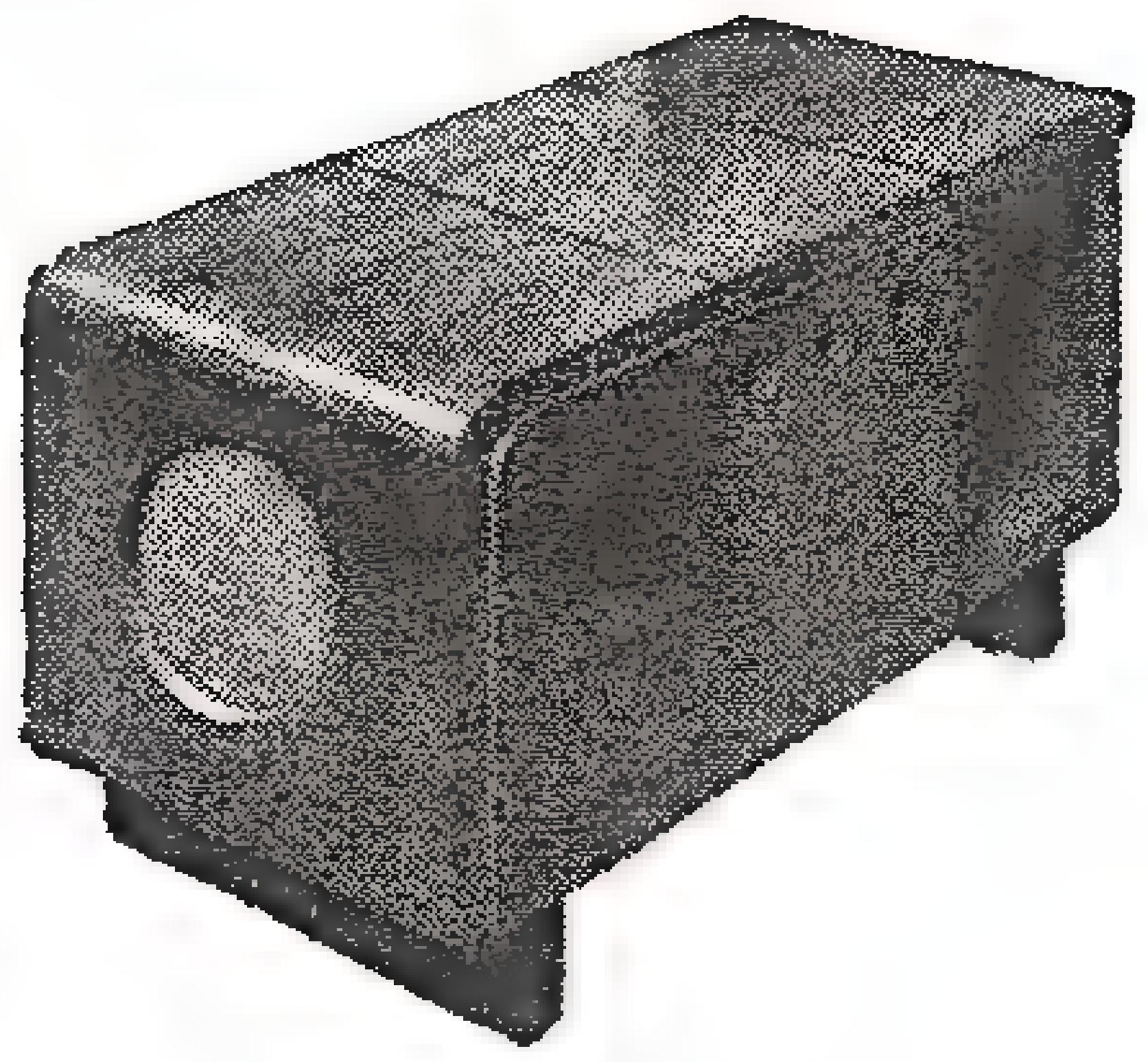

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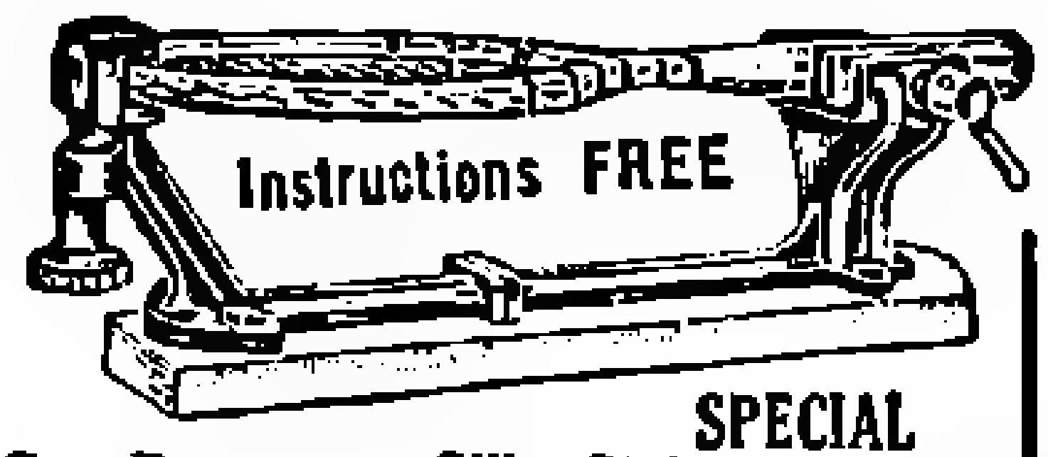

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LUBRICATES • CLEANS • PREVENTS RUST

Dr. Elihu Thomson, Inventor

[*Continued from page* 67]

During one of these lectures Thomson performed an experiment which, to his quickly discerning observation, revealed the clue of electrical welding, which he was to commercially introduce some years later. Authorities regard it as one of the ten greatest inventions of modern times. On this idea was founded an industry.

Incessant experiments in his little home-made laboratory suggested new ideas daily. Before he had reached his twenty-first birthday, Thomson quite clearly understood that Edison's "etheric force," so-called, was in fact electrical. In 1875 he produced oscillating discharges, or sparks, which set in motion electric waves passing through space—actually a perfect demonstration of wireless transmission twelve years before the work of Hertz, whose name was eventually applied to such waves.

It was during this period (1876) that Thomson and his friend, Edwin J. Houston, later to be partner in the famous Thomson-Houston Company, patented their first invention—a rail fastener for street car track.

Meanwhile the reputation of young Thomson had spread like wild-fire. Electric companies were continually seeking his services. Finally the American Electric Company, of New Britain, Conn., induced Thomson to withdraw from the classroom and become their chief engineer. Two years later Thomson resigned from this position and he and Edwin J. Houston formed the Thomson-Houston Company. During his 12 years in this company, Thomson contributed nearly 400 inventions.

Of supreme importance during these twelve fertile years was Prof. Thomson's work in laying the basis for successful alternating current motors. Prof. Thomson's vision of the practical possibilities of the alternating current grew out of his famous discovery, by continuous experiment, of the repulsion principle. The formal announcement of this event was contained in a paper read by him on May 18, 1887.

The action which Thomson had observed was defined by him as "electro-inductive repulsion," and was quickly understood as fundamental in that branch of alternating-current development. From these experiments sprang the induction motor for single-phase work and the repulsion motor, both by itself and in combination form. It lessens the value of Thomson's work in no respect to record that the ultimate development of the new principle was carried out largely by others. Indeed, the paper of 1887 stimulated numerous designers to work with alternating-current apparatus. Tesla once declared that this paper suggested to him all the latent possibilities of induction motors—a field of design in which he later became preeminent. It was a perfect example of the teacher imparting to others his own new and valuable ideas.

[*Continued on page* 149]

New 6-Volt TRINDL Electric ARC WELDER

PATENTS PENDING

Works on Storage Battery or 110 Volt Light Circuit

A REAL WELDER

Men, here is the hottest specialty item that has come along in years. A real honest to goodness electric arc welder that does a man size job. Built sturdily of the finest materials. Requires no mechanical knowledge—any one can use it. Every demonstration should make a sale. This new Trindl Electric Arc Welder is made possible by the invention of a low voltage carbon which gets white hot from the current of an ordinary 6 volt storage battery such as in your automobile. It only uses about 20 to 25 amperes of current which is about the same current drain as 4 headlight bulbs, yet develops about 7000 degrees of heat.

MELTS IRON AND STEEL INSTANTLY

The Trindl Welder is simple to use. Expert welding can be done by anyone. The Trindl Arc Welder is the only battery welder that, after a rigid test, has been approved by the Automotive Test Laboratories of America. It is ideal for making permanent fender repairs—also for broken castings, radiators, cylinders, water jackets, holes in auto bodies, hog troughs, boilers, tanks, milk cans, radios, batteries, etc. Iron, Steel, Brass, Copper and Tin can be worked on for a quick and permanent repair. The repaired part will be as strong as before.

NEW 110 VOLT CONVERTER MAKES FULL SIZE PROFESSIONAL UNIT

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Make "Tin Can" Photo Printer

[*Continued from page* 114]

for printing. A piece of yellow paper similar to that used in the hinged frame is pasted over the opening in the side of the can to provide safe-light illumination during the developing process. The printer is completed by making the printing frame. This is made from the hardwood board which is rounded on the corners and the center cut out to allow an opening of 3⅞" by 6½". On one side of the board rout out a recess to a depth of ½" so that it will fit snugly over the top of the can. Rout out the other side to take a 4½" by 7" sheet of glass so that it will be flush with the frame. Complete the printer by cutting a piece of ¼" plywood the same size as the frame, sawing it into three sections as shown in the accompanying illustrations and hinging together with small brass hinges. Before attaching the hinged sections to the frame back them with dark felt and attach a small knob for convenience in lifting the platen.

To use the frame mask the glass with black tape, placing the negative and printing paper on top. Close the platen securely then pull the cord which connects to the hinged frame inside the printer. This exposes the printing paper to the white light after which the cord is released, the paper removed and developed.

Servicing 200 Trains Daily

[*Continued from page* 77]

away a blue flag is set up at each end, showing that it is under inspection. A whole crew of workers swarms over the train, inside and out. First and most important of all its servicing is the close inspection and lubrication of its complete running gear—wheels, bearings, springs, brakes and brake rigging as well as the rest of its below-decks equipment. Unlike the old Scotch song this isn't a place one could get that cushy job of helping the car wheel tapper listen.

When the cleaners take charge a fleet of yard trucks brings fresh linen for the sleepers, new supplies of provender for the diner while they haul away soiled sheets, pillow cases and towels, plus the garbage and waste paper accumulation.

That casual mention of soiled and fresh linen doesn't mean that laundry is just one of the many small chores the yard handles every day. In fact, it's rather a man-sized job, requiring a plant so large that it had to be located outside of the yard proper. That laundry handles an average of eighty to eighty-five thousand pieces in three eight-hour shifts. Then there's just another little laundry item—half a ton of wiping rags must be washed every twenty-four hours. The heaviest part of the job is in the summer. The cars have been washed outside—periodically they get an oxalic acid wash in addition to the daily hose and brush—their interiors have been vacuum

[*Continued on page* 136]

Atlas

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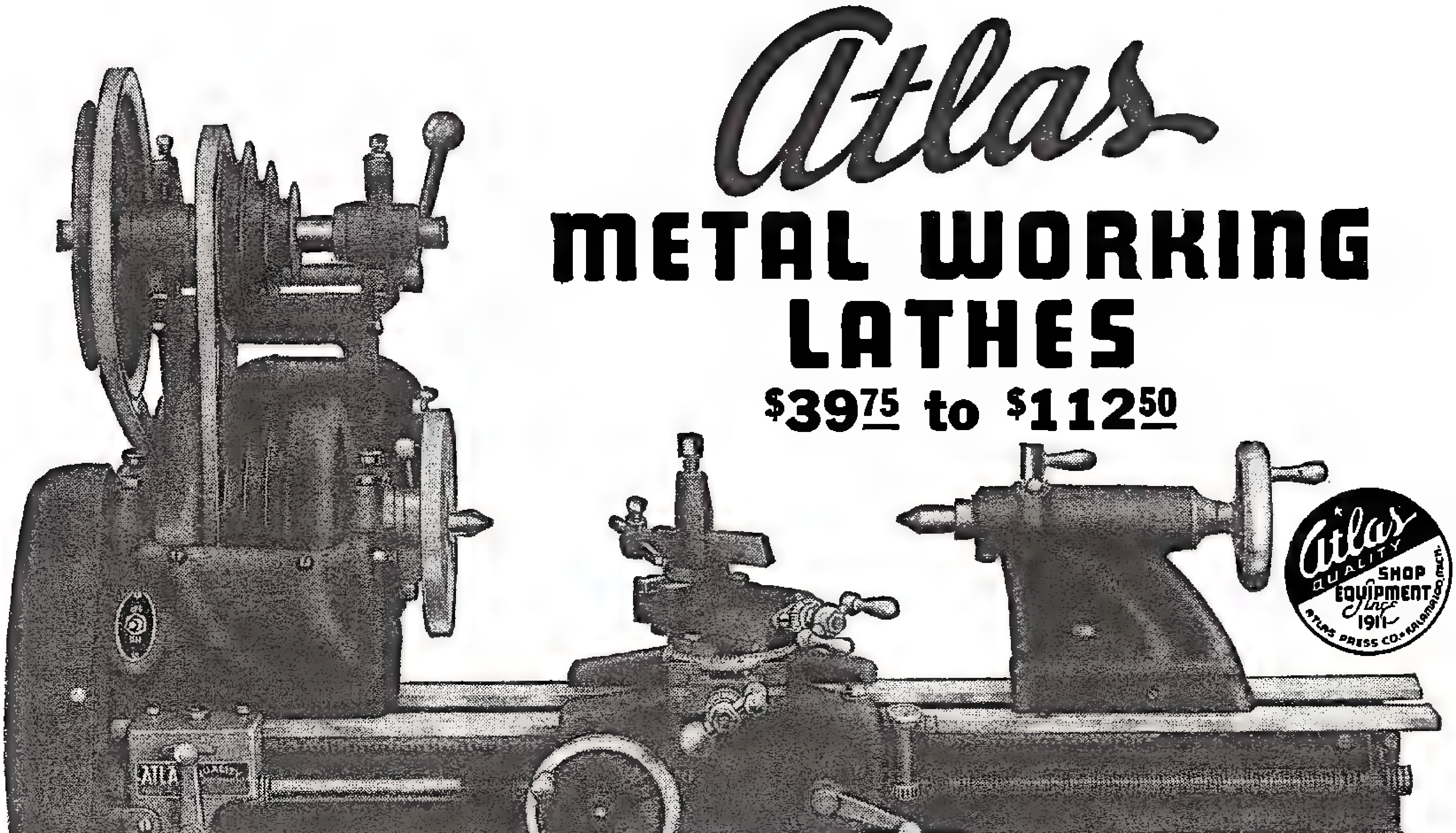

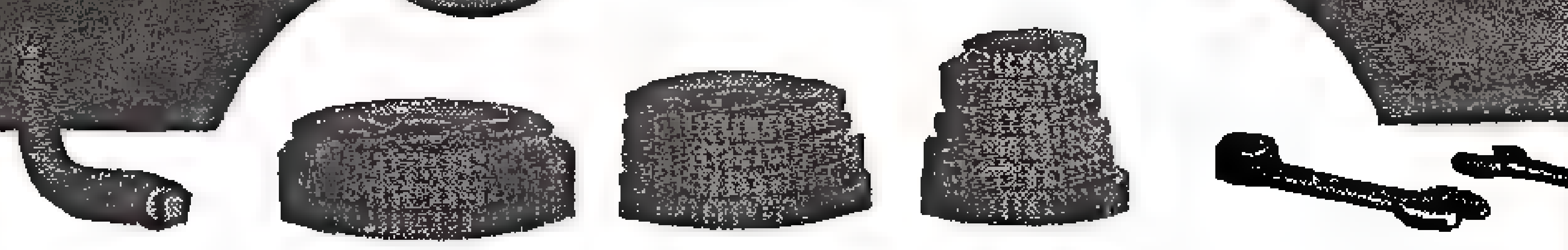

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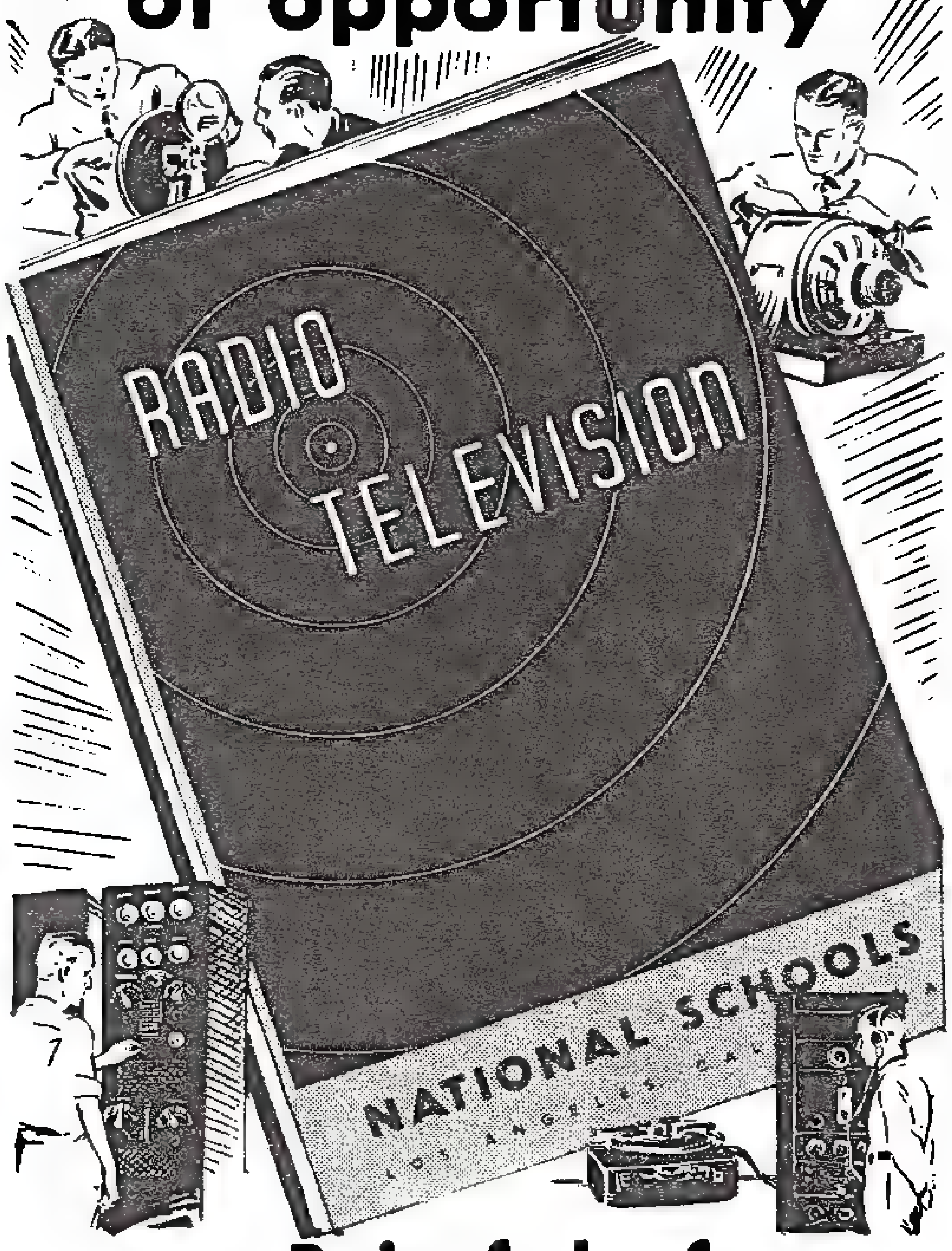

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Collectors Vie for Banks

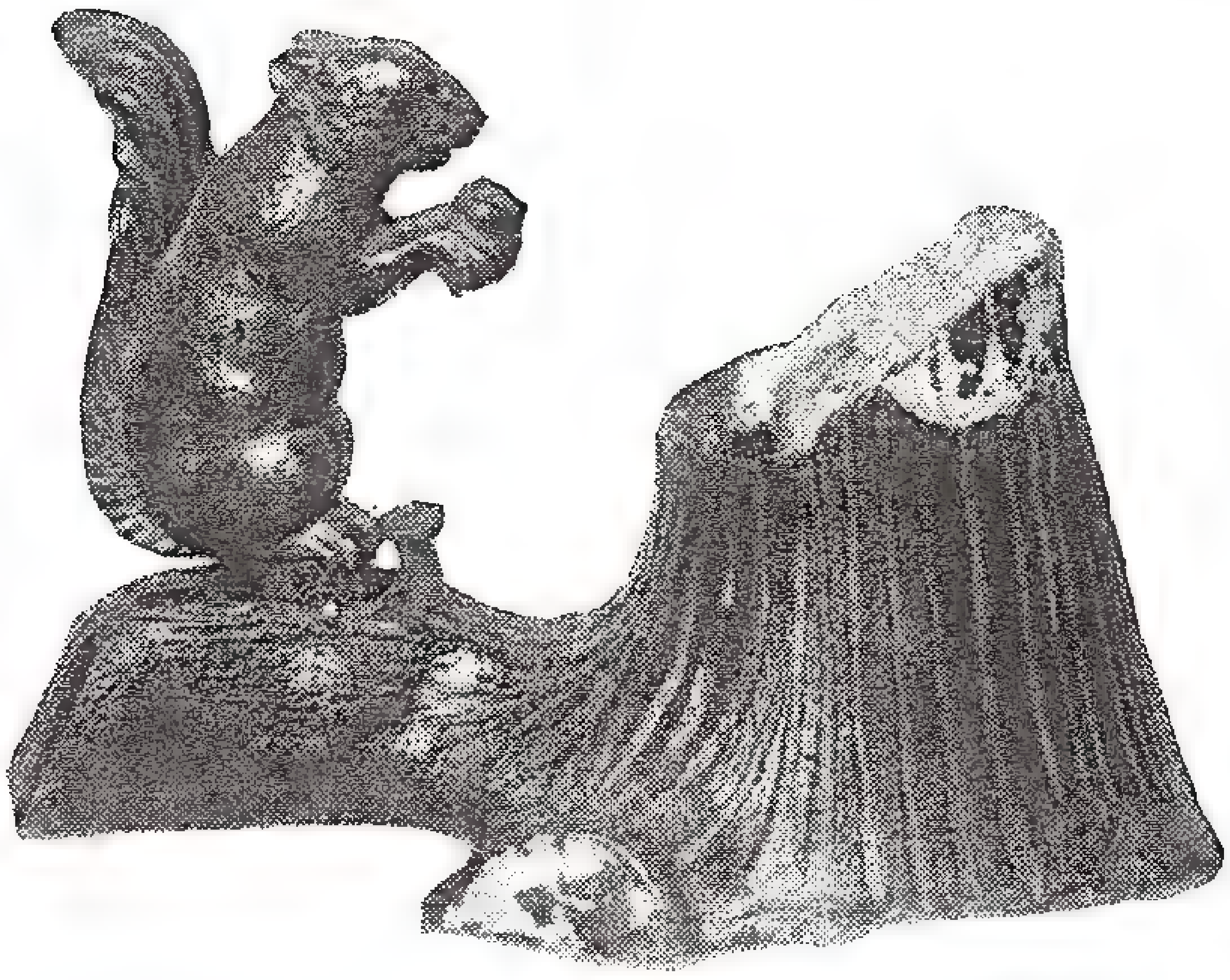
[*Continued from page* 83]

of silver in a very graceful urn shape on which is an inscription indicating that it was a Christmas present from a man to his daughter. On it are beautifully embossed the horn of plenty, a rock suggesting safety, an oak leaf for sturdiness, a beehive for thrift, and various other designs.

One of two pewter banks in the collection is a replica of an old-fashioned chest of drawers complete in every detail. This is a rare bank as very few toy banks ever were made of pewter.

In the very fine collection of Walter P. Chrysler may be found one of almost every type of juvenile bank, both non-mechanical and mechanical, known to collectors.

Among the rare banks in this collection is one which may have been designed as a sort of oracle on the stock market—the "Bull and Bear." The animals stand facing each other and between them is a small fan-shaped indicator with a slot at the top for the insertion of a coin. When the coin drops the indicator swings toward either the bull or the bear, thus suggesting which way the market is going.



This tricky little squirrel, in the bank collection of Dr. A. E. Corby, would toss coins into stump, amusing children of nearly a century ago and at same time teaching them the wisdom of saving pennies for the proverbial lean days.

In a catalogue issued by the Stevens Company, a Buster Brown bank is listed, but for a long time no one was able to find any such bank. At last one turned up and it now has a place in Mr. Chrysler's collection. Buster and his dog are shooting the chutes in a car. After a coin is placed in a slot near the end of the chute, the car slides down and pushes the coin in.

A very early Stevens is the "Billygoat bank." After a coin is inserted in the slot, upon the pulling of a wire the goat butts the coin into the bank.

A few of the old time trick banks are being reproduced and put on the market, but the true collector is not easily deceived by these, as he knows the earmarks of the real "antique." Even in the genuine old banks there is considerable

[*Continued on page* 135]

ELECTRIC ARC WELDER

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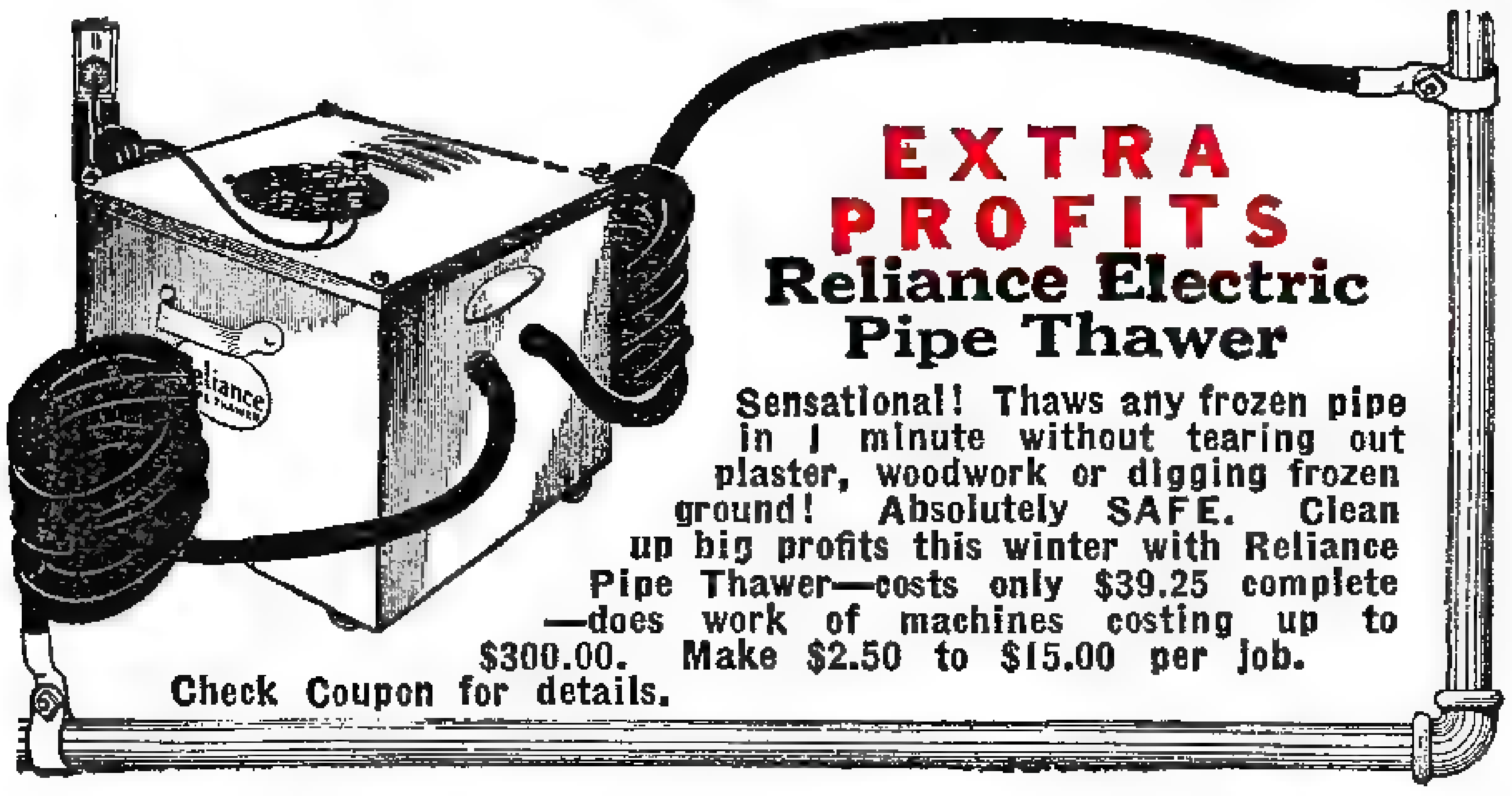

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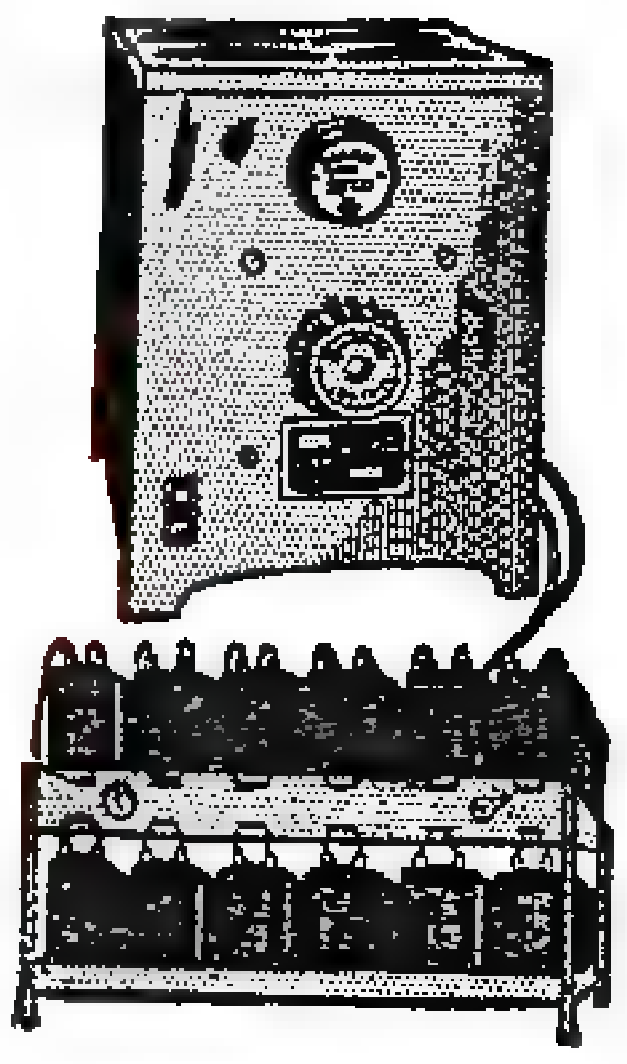

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Romance Of The Tin Can

[*Continued from page* 72]

ture, and can making machinery manufacture. All these are separate and individually organized enterprises today, though inter-related and interdependent, and all are thriving, carrying out the processes that have defeated Nature's parsimonious way of parceling out man's foods according to harvesting seasons and at no other time. The tin can places June foods on the January platter.

The scene now changes to America. William Underwood built a flourishing canning business in New England, after landing at New Orleans and walking all the way to Boston. Thomas Kensett, another immigrant from England, applied for the first American patent on the tin can. Patent officials considered it a hoax and the application gathered dust in a pigeonhole for 10 years. When finally granted the patent was signed by President James Monroe.

Underwood started using tin instead of glass in 1839 but it was still some time before the tin can surpassed the glass container.

During this period of development construction was crude and by hand. An expert tinker could make perhaps 60 cans a day. Jump across the years to the present. In the time taken by that early tinker, whose speed was the wonder and envy of his fellows, to make his 60 cans, today's automatic machine produces 180,000.

The Civil War furnished the first boom for

[*Continued on page* 155]

"Airflow" Sled Gives Thrills

[*Continued from page* 104]

be seen, the old steering wheel is mounted on a pivoted column which permits it to be rocked back and forth. The wheel, when turned in the usual manner, operates the steering arms by means of airplane cable such as is obtainable at any airplane supply house or at your nearest flying field. The wheel, when pulled back, operates the brake—a simple drag pawl. The beauty of this arrangement is that it not only permits the application of the brake without removing hands from the wheel but the whole business of braking becomes practically an instinctive motion. Furthermore the leverage provided by the column is sufficient to ensure adequate pressure of the pawl against the ice without undue effort on the part of the pilot.

The steering-braking column, resembling as it does the controls of a plane, is mounted as shown. The exact position will of course depend upon the car you have obtained as well as, in some degree, your own personal opinions and preferences in the matter. Immediately in front of the steering column is placed the new dash upon which you now install the equipment removed from the original dash. As the new dash will be some considerable distance from the motor you will

[*Continued on page* 169]

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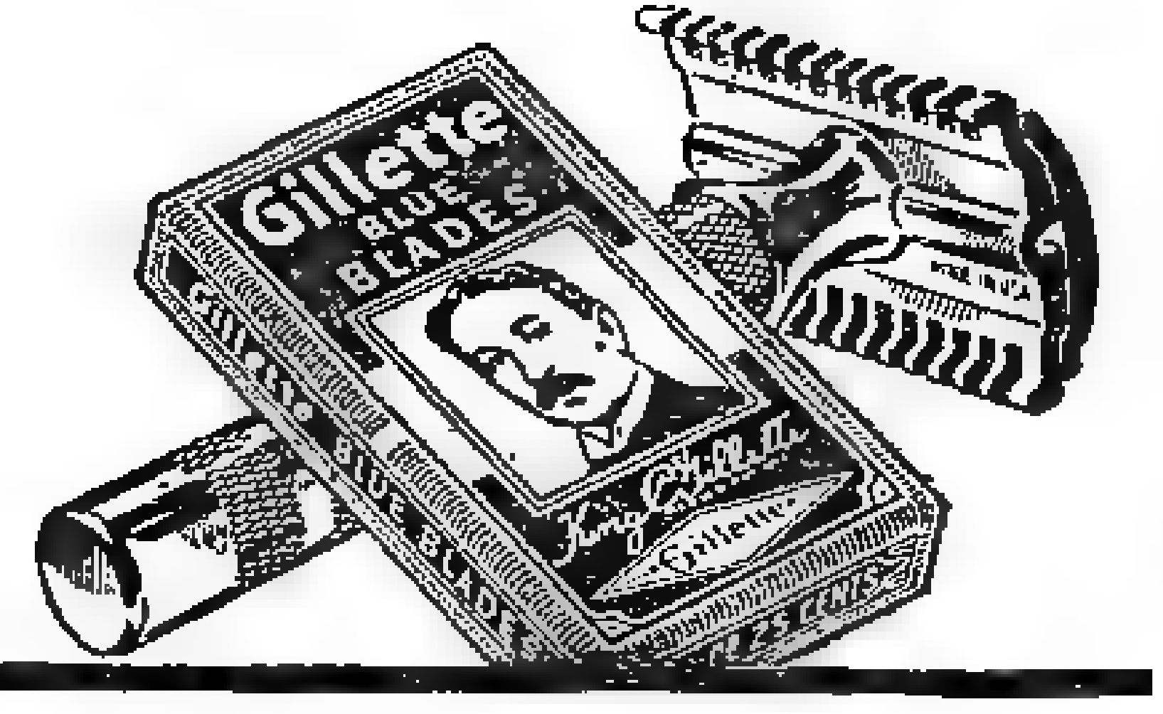

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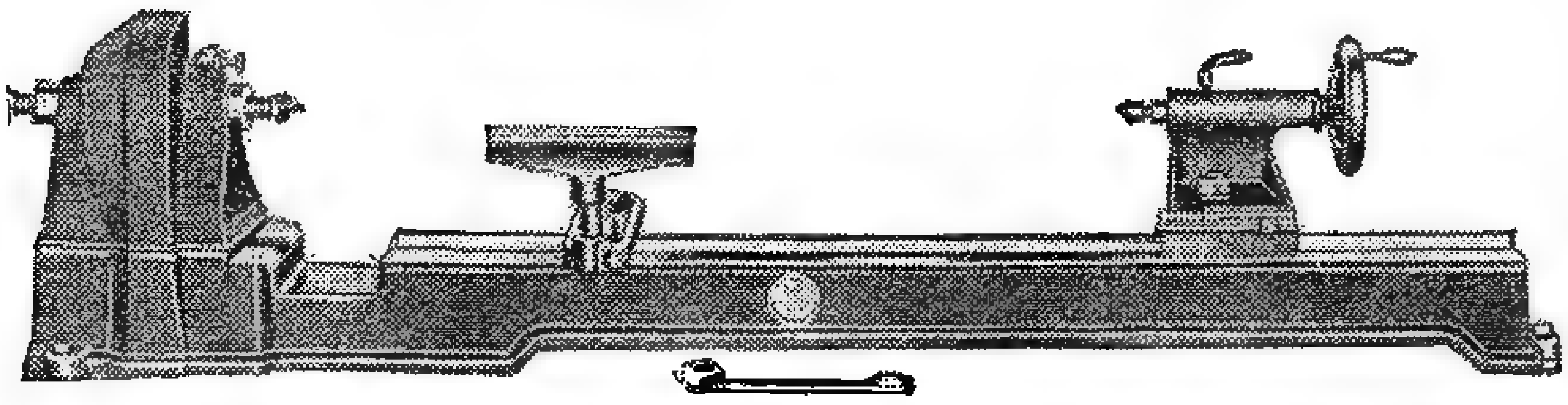

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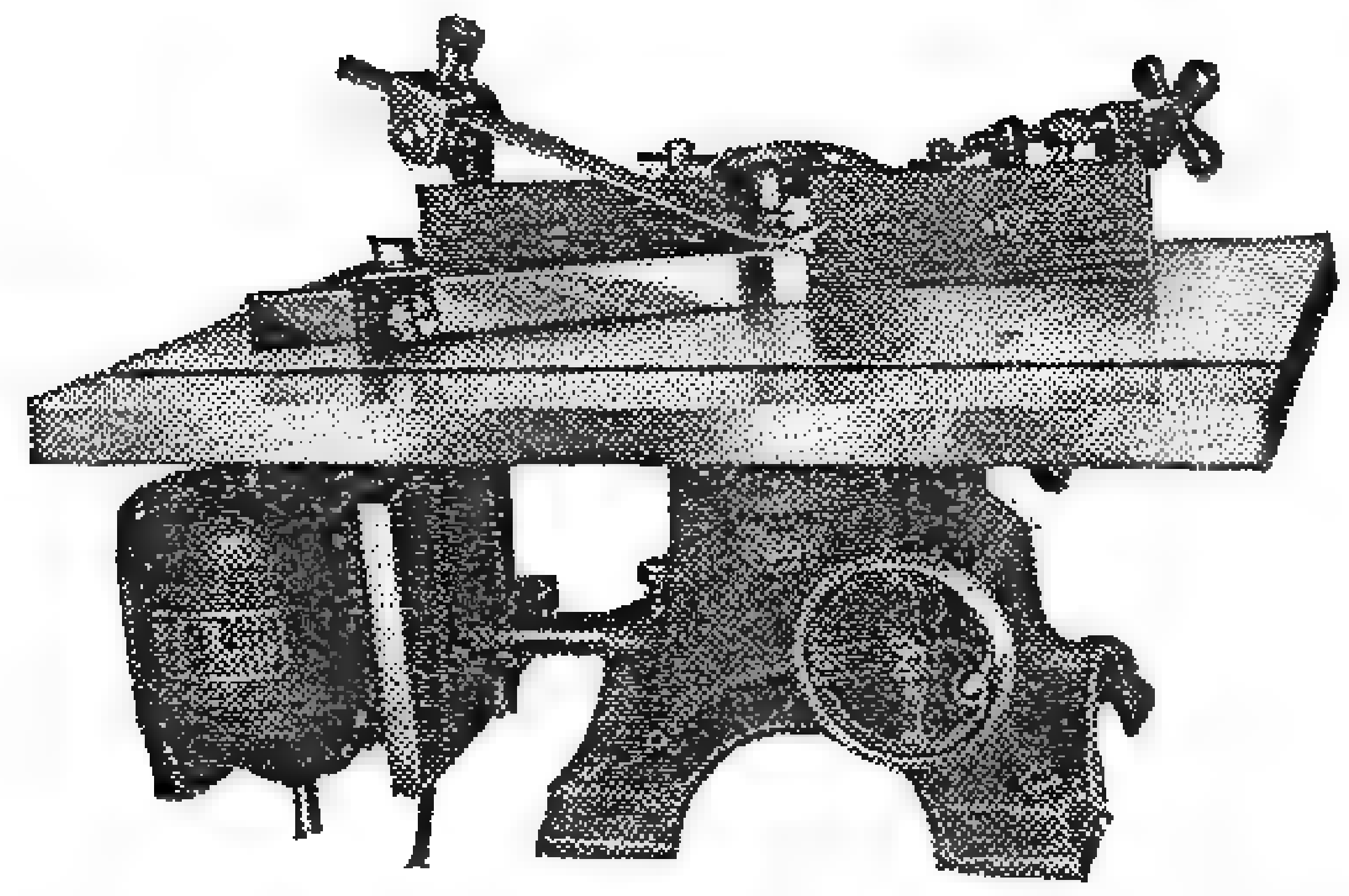

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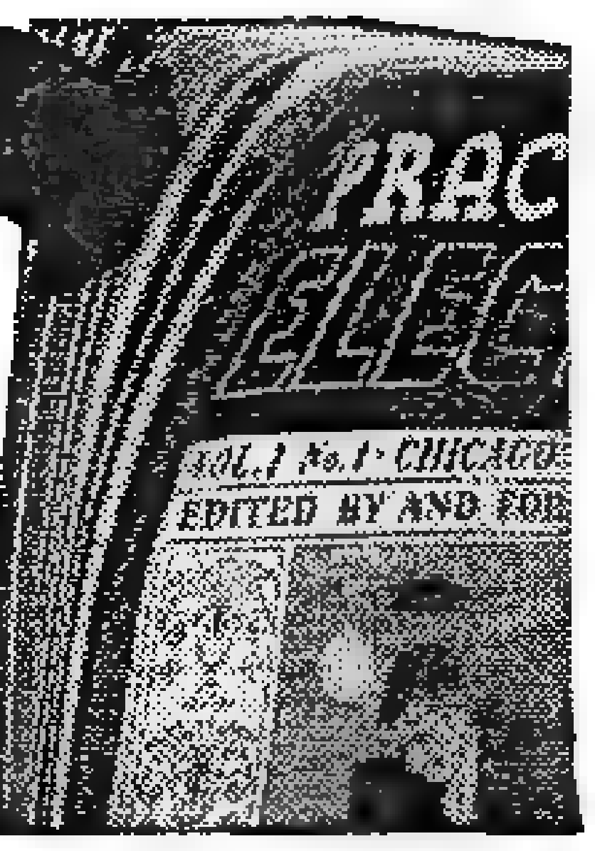

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Reactance Coil Experiments

[*Continued from page* 113]

dark goggles when experimenting with arcs or welding.

Small quantities of metal can be melted in a carbon arc furnace which has been moulded from fire clay. In moulding the crucible allow two holes, one on each side, so that arc light carbons can be inserted. File down the tips of the carbon electrodes until well pointed, attach wooden knobs or handles to the ends of these and insert in the crucible. Attach a battery clip to each of the electrodes, then adjust until a brilliant arc is produced.

Probably the most interesting of all experiments with the reactance coil is its use in producing ultra violet rays. To construct the ultra violet ray projector first secure a five gallon oil can and cut off the top. Bend over the edges so as to provide mounting flanges for fastening it to a wooden base. In the top of the oil can drill several air vent holes and over them mount a tin shield riveting it in place as shown in the accompanying diagrams. In the side of the can cut an opening for a small piece of smoked glass to serve as a peep hole when adjusting the carbons.

An opening is cut in the front of the can for the ultra-violet filter glass which fits into a slide which is riveted over the opening. An asbestos paper gasket provides a light-tight fit for the glass.

Cut holes in each side of the can for the carbon electrodes. For insulators use porcelain tubes which are provided with threads on the outside. Any electrician's supply house can supply these for a few cents. After mounting the tubes insert the carbons and adjust for maximum brilliancy. Forged documents, jewelry treated with acid to remove initials that were engraved in the metal and other articles which have been tampered with can be easily detected when held before the ultra-violet filter glass.

A powerful searchlight for experimental use can be made from a pair of carbon electrodes similar to those used in the ultra-violet projector and an automobile headlight reflector. Cut holes in each side of the reflector for the porcelain insulator tubes. Next mount the reflector shell to a suitable stand, insert the carbons and the searchlight is ready for use. Connect it to the reactance coil in the same manner as you connected the ultra-violet projector.

Two Tube Set Tunes In World

[*Continued from page* 111]

tector portion of the circuit made to a single point on the chassis. Connections to the coils must be made exactly as shown in the diagram in order to insure oscillation. It will be noticed in the diagram that the detector circuit in this set is different from the usual electron coupled arrangement. This new version using a separate feedback coil is more sensitive and selective than the older type in which the coil is tapped in order to provide regeneration.

Whether home-made or manufactured coils are used depends upon the preference of the builder. If the latter are used, it will be necessary to reduce the number of turns on the "tickler" or smallest winding. An electron coupled detector requires only a small feedback coil to provide plenty of regeneration and if the coil is too large there will be a tendency for howls and super-generation. The builder winding his own coils should likewise experiment with the tickler windings; the windings should be as small as is consistent with smooth regeneration.

It is well to test the set first on the broadcast band, using a good antenna. Tuning is the same as with any regenerative set; the regeneration control is turned up until oscillation is obtained, and then the tuning condensers are adjusted until a whistle, indicating that the receiver is tuned to the carrier wave of a station, is heard in the headphones. Readjustment of the regeneration control stops the regenerative whistle and the station becomes intelligible.

The filter circuit shown is sufficient, even when headphones are used on short waves, to reduce the hum to such a low value that it is well below the noise level at night.

As with any AC-DC set, no actual ground should be used. If desired, the set may be grounded through a .5 mfd. paper condenser.

For portable operation, a surprising number of things may serve as makeshift antennas, especially for broadcast band reception. On nights when conditions are good twenty-five meter Paris, Berlin, and Daventry stations can be heard with nothing but a metal bed for an antenna.

Collectors Vie for Banks

[*Continued from page* 130]

difference in value according to the rarity of certain types.

Of several rabbit banks, a rare one is in the collection of William F. Ferguson, of the Bank for Savings, New York. It is a large rabbit on an oblong base, which moves its ears when the tail is pressed.

At the Bank for Savings, Mr. Ferguson has a good collection of mechanical banks, and Wesley Hallett, also of that bank, has devoted his energies to the collection of non-mechanicals. Mr. Ferguson has an old bank, the Monkey and the Walnut, which is interesting. A coin is placed in the hand of the monkey, and when a spring is pressed the nut opens and the monkey drops the penny into the nut. Another valuable bank is the Cat and Mouse bank, and an amusing one is a colored mammy holding a pickaninny on her lap. The coin is placed on a spoon in the mammy's hand, and when a lever is pushed, the mammy's

[*Continued on page* 153]

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INVENTORS

SEE

Pages 8 and 9

Inventions Contest Winners

[*Continued from page* 48]

welcome the automatic funnel device suggested by E. E. Swanson, of Los Angeles, Calif., himself a station operator. The funnel would show when a can is filled thereby eliminating the wasting of fuel by overflowing. Third prize of $5 cash was awarded Mr. Swanson for his practical idea.

Prizes of $2 each were awarded to Mrs. Florence Barter, Hartford, Conn., who suggested a detachable cloth covering for clothes lines to protect washed clothes from dirt and soot covered lines; to Fred Foesch, Freeport, Ill., for his idea of a long forceps for removing olives, pickles, etc., from tall jars; and to Mrs. Margaret Kiner, Jamestown, North Dakota, for her idea of an electric iron with a control for heating only the tip while ironing ruffles, curtain ends, collars, etc.

Prizes of $1 each were awarded to: R. M. Currie, Portland, Ore., Ralph Merrill, Milwaukee, Wis., John T. Newman, Cleveland, Ohio, and Micheal J. Zallas, Michigan City, Indiana.

If you have any good ideas for needed inventions, send them to the Needed Inventions Contest Editor. Here are the rules:

1. In 100 words or less explain your idea for a needed invention. 2. This contest is open to everyone except employees of Modern Mechanix Publishing Co. 3. You don't have to buy a copy of the magazine or be a subscriber to enter. 4. Write your name and address plainly on your entry. No entries will be returned. 5. The editors will be the judges. All decisions will be final. 6. Mail your entry to Inventions Contest Editor, Modern Mechanix Publishing Co., Greenwich, Conn. Contest ends February 1.

Servicing 200 Trains Daily

[*Continued from page* 128]

cleaned and wiped down, windows washed, blankets and mattresses aired, fresh linen provided, the 250-gallon water tank filled, battery tested and charged if necessary, the panel boards, relays and lamps checked. Isn't she ready?

A few years ago, yes—but not any longer—at least not from May to October. Where then does the heavy job come in? To find that out I went to the big boss. I asked J. J. McGann, yardmaster, just as one railroader to another, what modern development of recent years had added most heavily to his grief as keeper of the world's largest passenger yard? Only one word was needed as an answer—"air-conditioning."

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It's the seventy odd per cent of those more than

[*Continued on page* 147]

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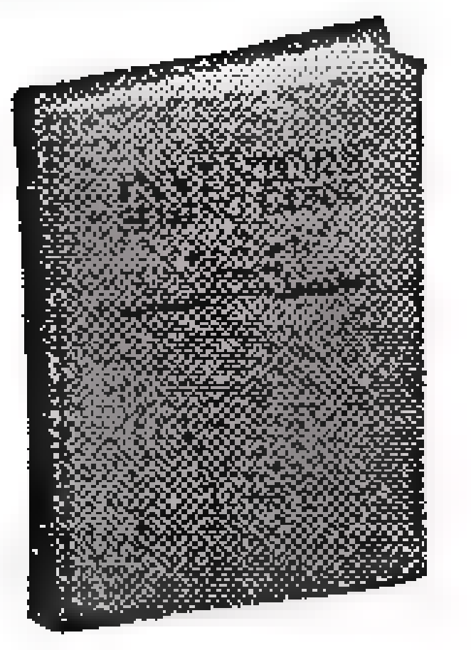

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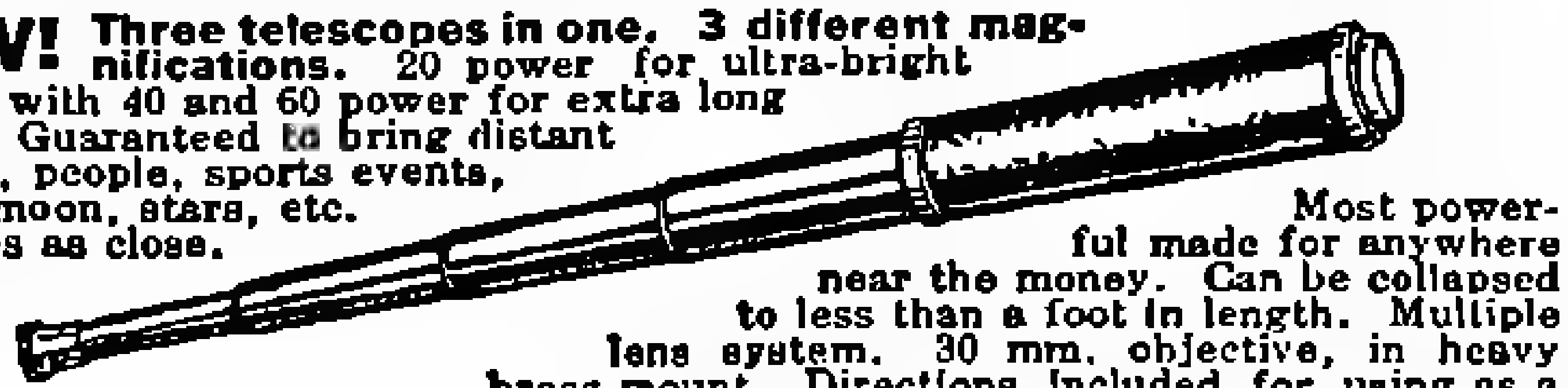

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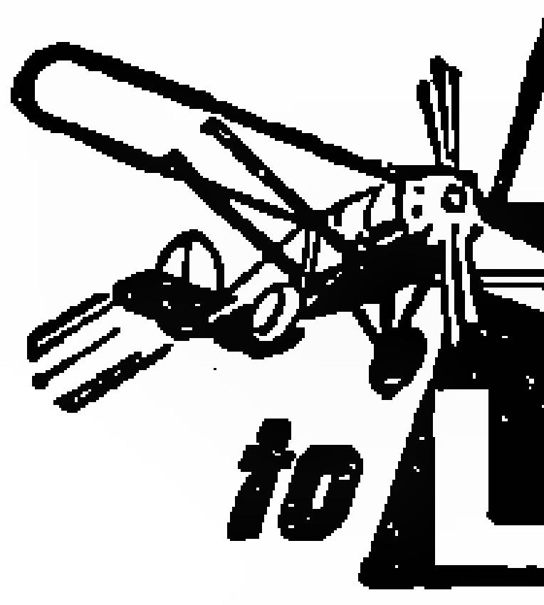

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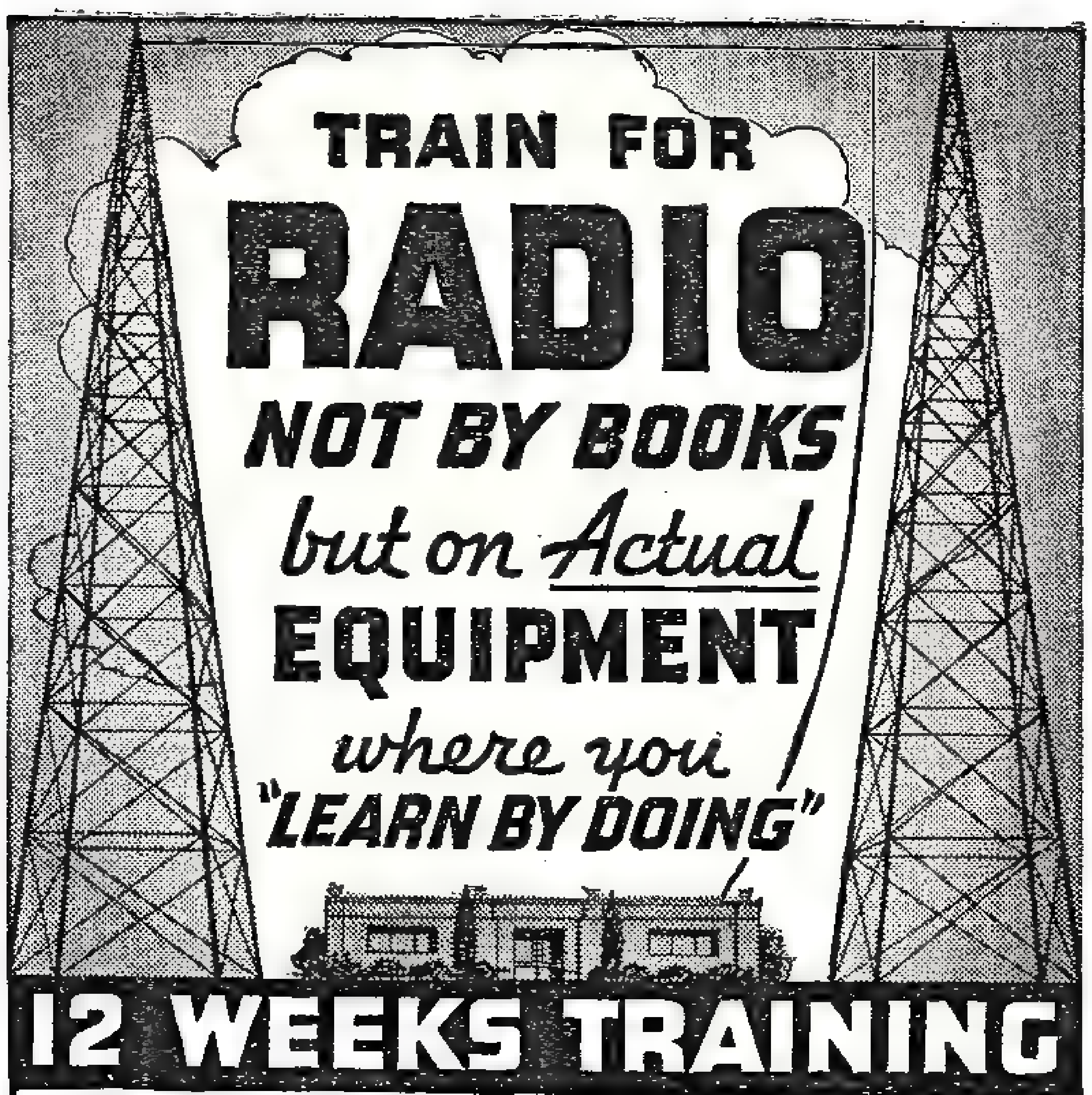

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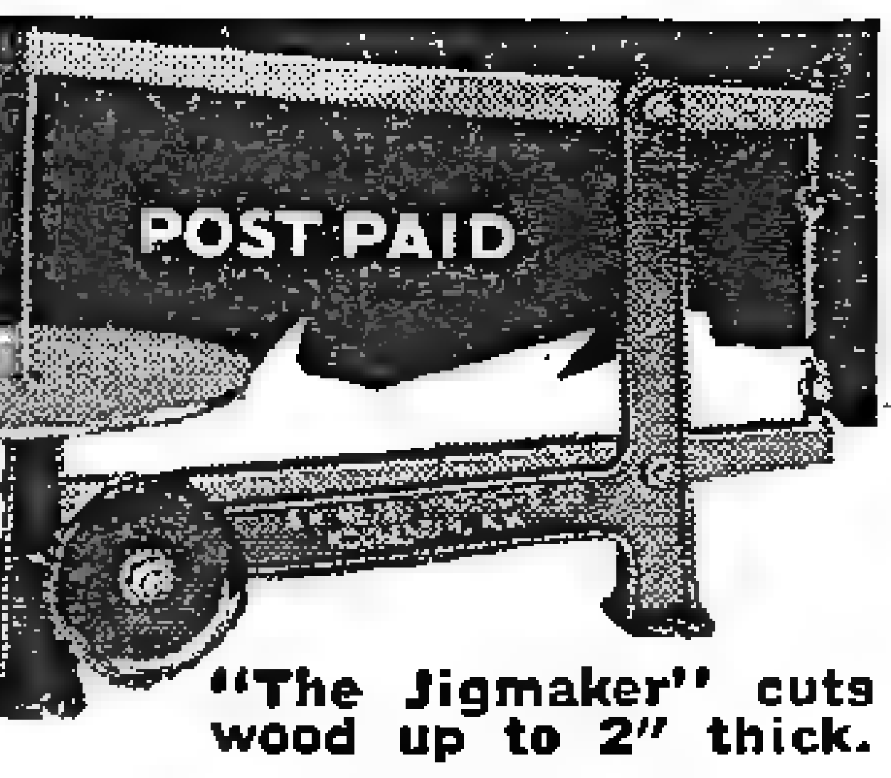

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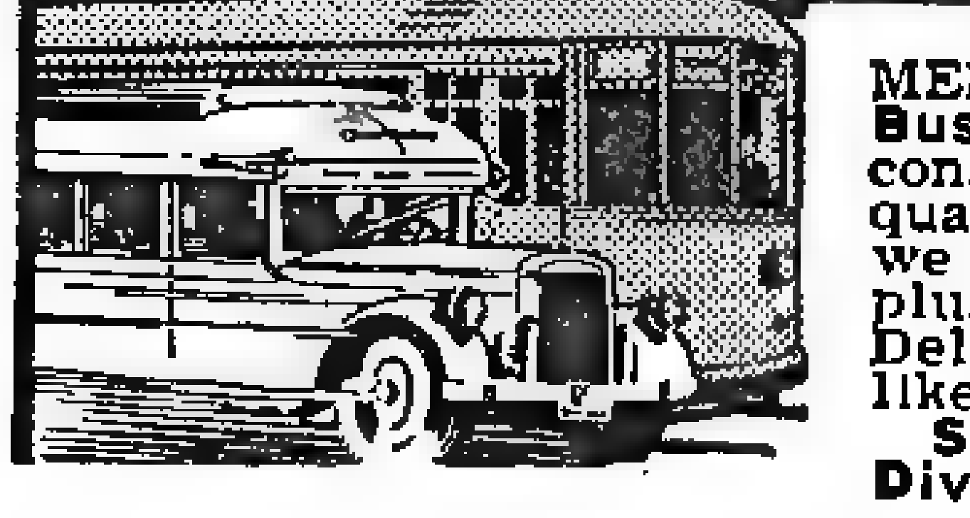

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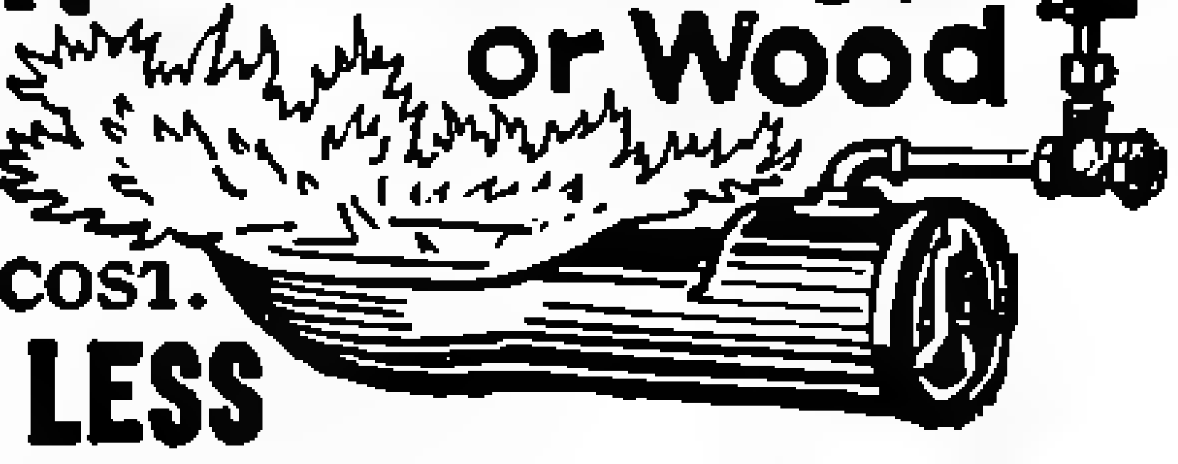

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Uncorking Bottled Traffic

[*Continued from page* 46]

schools along the road, through which children can cross in safety while pleasure cars and trucks rumble and roar overhead.

Police Departments in many cities are awaking to the need for practical application of traffic engineering to improve traffic control and thereby reduce the number of automobile accidents. Nearly 100 police officers from 14 States recently completed a course at the Traffic Officers' Training School of Harvard University.

In this study, arranged by the International Association of Chiefs of Police and the Automobile Manufacturers' Association, in cooperation with Harvard's Bureau for Street Traffic Research, the student officers were taught methods of locating and eliminating street hazards, ways in which traffic control devices may best be used, and means of gaining the co-operation of motorists and pedestrians in the interest of safety.

Into this picture of a motor world being remade through modern principles of traffic engineering has stepped the Federal Government. Today, under the direction of Thomas H. MacDonald, Chief of the United States Bureau of Public Roads, the bureau's forces are engaged in a vast stocktaking of the country's highway system, with the idea of rebuilding the highways where necessary so that they will stand more traffic and faster traffic—with safety.

In the past 17 years the Federal Government, through MacDonald, has spent some $2,500,000,000 to help the 48 States improve their highways, although the United States does not own a mile of these roads. Since the turn of this century, taxpayers of Federal, State and county governments have spent the staggering sum of $15,000,000,000 for the present national highway system.

Through the PWA more than $1,000,000,000 additional has gone into all types of roads with the idea, not of lengthening them—State and local roads throughout the country now cover more than 3,000,000 miles—but of improving the road shoulders, providing better markings, removing dangerous curves and grades, widening rights-of-way, bettering the pavement, and eliminating dangerous railroad crossings by underpasses or overpasses.

The Biggest Army

[*Continued from page* 53]

long-sustained flight. Air attaches, however, criticize them for their slowness. They are said to have a speed of little more than 100 miles per hour, as compared with 238 for some of the latest American bombers.

Could these giants, taking off from an air field near Vladivostok, destroy Tokio or Yokohama and return to their base? I have seen many hours of time, a good quantity of Scotch whisky and many packages of cigarettes consumed during evenings in Moscow as military experts debated this subject. And I have never heard any two of them agree fully. A near compromise was reached on the thesis that if a large flight, say 100 bombers, took off for Tokio, enough of them would reach there to inflict heavy damage, but only a few of them would ever return to their base. It would be a suicide mission.

The Soviet Union, however, is making rapid progress in both air craft design and motor efficiency. Its Air Corps probably is improving more rapidly than that of any other European country. And it recently has adopted some surprising innovations, for instance the dropping of an entire regiment of troops, equipped with machine guns, by parachute behind "enemy" lines during maneuvers. Only war will tell whether this spectacular stunt has real military merit.

From a geographical viewpoint, there are really two Red Armies—one in the Far East, the other in the West—which, aside from the central control in Moscow, operate as independent units. This policy results from the Kremlin's conviction that Russia probably will be forced to fight Japan and Germany simultaneously.

The European army in the West is garrisoned along a broad arc extending south from Leningrad, down through Minsk, on to Kiev and the Black Sea. Its primary mission is to protect the Soviet Union from an attack through the Baltic states by Germany, or a drive by Poland or Germany into the Ukraine. Naturally, there are also garrisons around important interior cities like Moscow.

Probably because of the long-standing Japanese "war scare," it is the "Special Red Banner Far Eastern Army," commanded by General Vassily Bleucher, which has been the favored child of the Soviet Government. Upon this force, strung out from Lake Baikal to Vladivostok and numbering about 300,000 men, will fall the brunt of resisting the long-predicted Japanese invasion, when and if it materializes. It is backed by a large air force and a tremendous concentration of food and munitions to insure its independence until aid can reach it from European Russia.

For several years after the Japanese began their northward march into Asia the *bete noire* of the Soviet general staff was the problem of supplying this force, nearly 4,000 miles from Moscow and connected with Europe only by the slender, steel rails of the Trans-Siberian railroad. With frenzied energy, the Kremlin set about strengthening the Far East Army. First, the Trans-Siberian was double-tracked, vastly increasing its carrying capacity. A second line, parallel to the Trans-Siberian but about 100 kilometers north of it, from Lake Baikal to the Pacific, has been projected. New sources of coal and iron have been exploited in Siberia to provide these sinews of war locally. The Far Eastern Army, save for troop re-enforcements, has approached an independent status.

Armies win wars not with guns alone, but also with the brains which direct them, the morale

[*Continued on page* 140]

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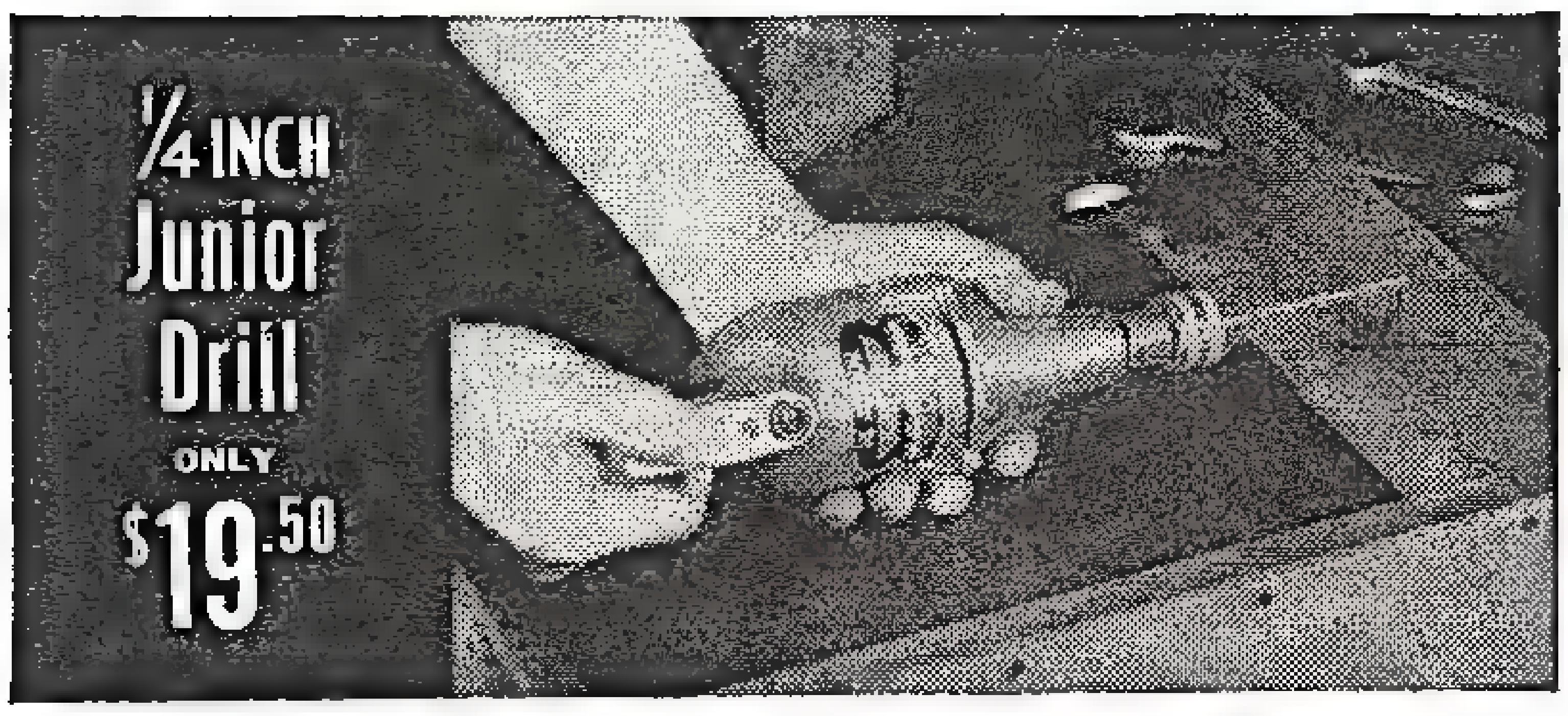

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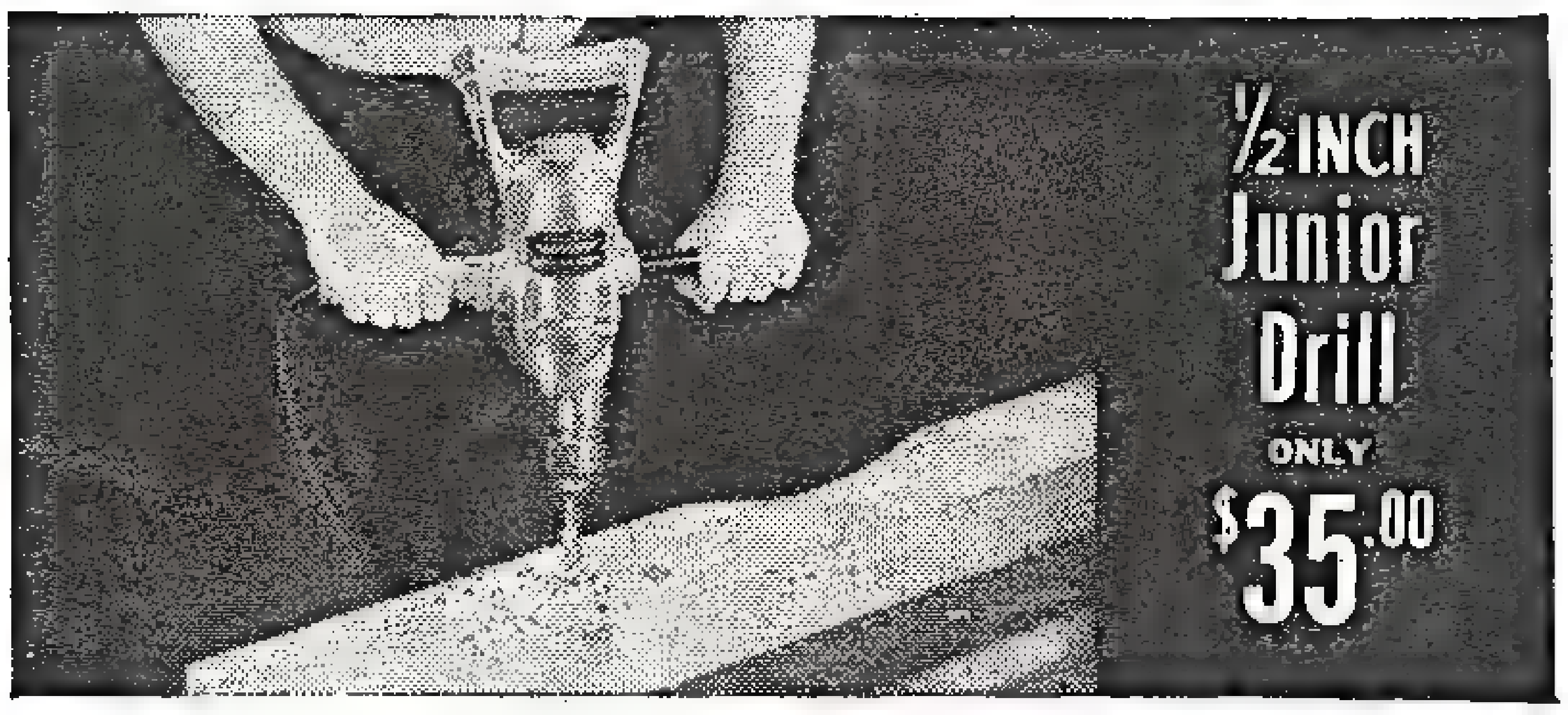

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The Biggest Army

[*Continued from page* 139]

which inspires them and the industrial and agricultural reserves which supply them.

Five marshals provide the brains and directive energy of the Red Army. They are:

Klementi Voroshilov: Commissar of War. Of working class origin. Joined the Social Revolutionary party in 1903 and took part in the revolution of 1905. Gained fame by his joint defense, with Stalin, of Tsaritsin against General Denekin during the Civil war. Member of the Central Committee of the Communist party since 1921 and of the Politbureau since 1926. Trim, gray-haired, genial, and Stalin's closest friend.

Mikhail Tukashevsky: Assistant Commissar of War. Came from an aristocratic family. Was educated in the Alexandrov Military School and served as an officer in the Tsarist army during the World War. Joined the Bolshevik party in 1918 and fought against the "Whites" during the Civil war. Won fame for his campaign against the Poles in 1920. Member of the All-Union Central Executive Committee. Known as the "brains of the Red army" and probably would be its commander-in-chief in the field in the event of war.

Simeon Budonney: Inspector-general of Cavalry. A hard-riding, walrus-mustached old cavalryman who is alike the idol of his troops and the debutantes of the diplomatic circle in Moscow. Came of Cossack peasant stock. Arose in the Soviet heirarchy by his dashing cavalry campaigns against the "Whites" during the Civil war. One of the most jovial and popular Soviet leaders.

Vassily Bleucher: Commander of the Far Eastern Army. Of mysterious origin. All the names he has used are assumed. A metal worker in Central Asia when young. Advanced to an officership in the Tsarist army during the Civil war. Was sent by the Soviets to China during the rise of the Chinese Nationalist movement to organize their army. Cool, shrewd, competent and holds the most important field position in the army-defense of the Far East.

Alexander Vegesov: Chief of Staff. Son of a worker, but became an officer in the Tsarist army before joining the Bolsheviks. Primarily a theoretician on military tactics. Little known.

At the end of the Civil war period, virtually the only officers in the Red Army with any degree of technical knowledge—men capable of staff work—were those who had been trained in the Imperial military academies and steeped in the traditions of the former ruling class but who, for various reasons, had gone over to the Bolshevik side. Many of them proved the sincerity of their conversion, as did Tukashevsky. But the Bolsheviks, while forced to employ their technical skill because they had no other, did not trust these men. To each of these former Tsarist officers was attached a political aide who reported to the Communist chieftains regularly on his conduct.

This lack of officers whose loyalty was beyond doubt was a serious problem. The Communists attacked it by establishing technical schools in the Army and utilizing the education of the older officers to teach the more intelligent recruits from the workers and peasants the rudiments of military science. Now, sixteen years after the Civil war, officers of the higher ranks are virtually 100 per cent members of the Communist party. And even in the lower grades of officers, more than half are so affiliated.

At present there are thirteen military schools for training officers, with a total enrollment of 16,000. The term was increased recently from four to five years. In addition, six civilian schools offer courses for military engineers.

Vigorous moral support of the Soviet Union and of Communism, as the world knows, has been built up by one of the most intensive and extensive propaganda campaigns in history. The Russian, both in and out of the Red Army, has dinned into his ears daily by radio and through the press what amounts to a religion, its basic tenets being:

1.—The workers of Soviet Russia are the most fortunate people in the world socially, economically and politically.

2.—Foreign capitalists, fearing a revolution of their proletariats because they envy the Russians, are planning a war of extermination against the Soviet Union.

3.—The Red Army is the guardian of the "Workers' Republic" against those who would destroy this Communistic Utopia.

Not one Russian in 1,000 ever sees a foreign newspaper or hears a foreign radio speech. Hence, this propaganda is thoroughly believed.

Moreover, the Red Army man is made to feel fortunate by the superior living conditions which he enjoys. During years when many workers and peasants were suffering from malnutrition or, in some cases, actually starving, the Red Army was well fed and warmly clothed. While millions of civilians were wearing rags and wrapping their feet in straw, the soldiers had warm great-coats and good boots. Physical comfort as well as political propaganda bound him firmly to the Army and the State.

Now, economic conditions among the civil population are far better than at any time since the revolution and the contrast is not so sharp. But the Red Army man still enjoys more physical comforts than his average brother on a farm or in a factory.

In the event of war the soldier's loyalty to the government is likely to be much firmer than that of the Tsarist soldiers, who rarely knew just why they were fighting, for the Red Army man is schooled today to believe he is defending a high and definite ideal.

What of the weaknesses of this Gargantuan army? Oddly enough, despite the revolution and

[*Continued on page* 142]

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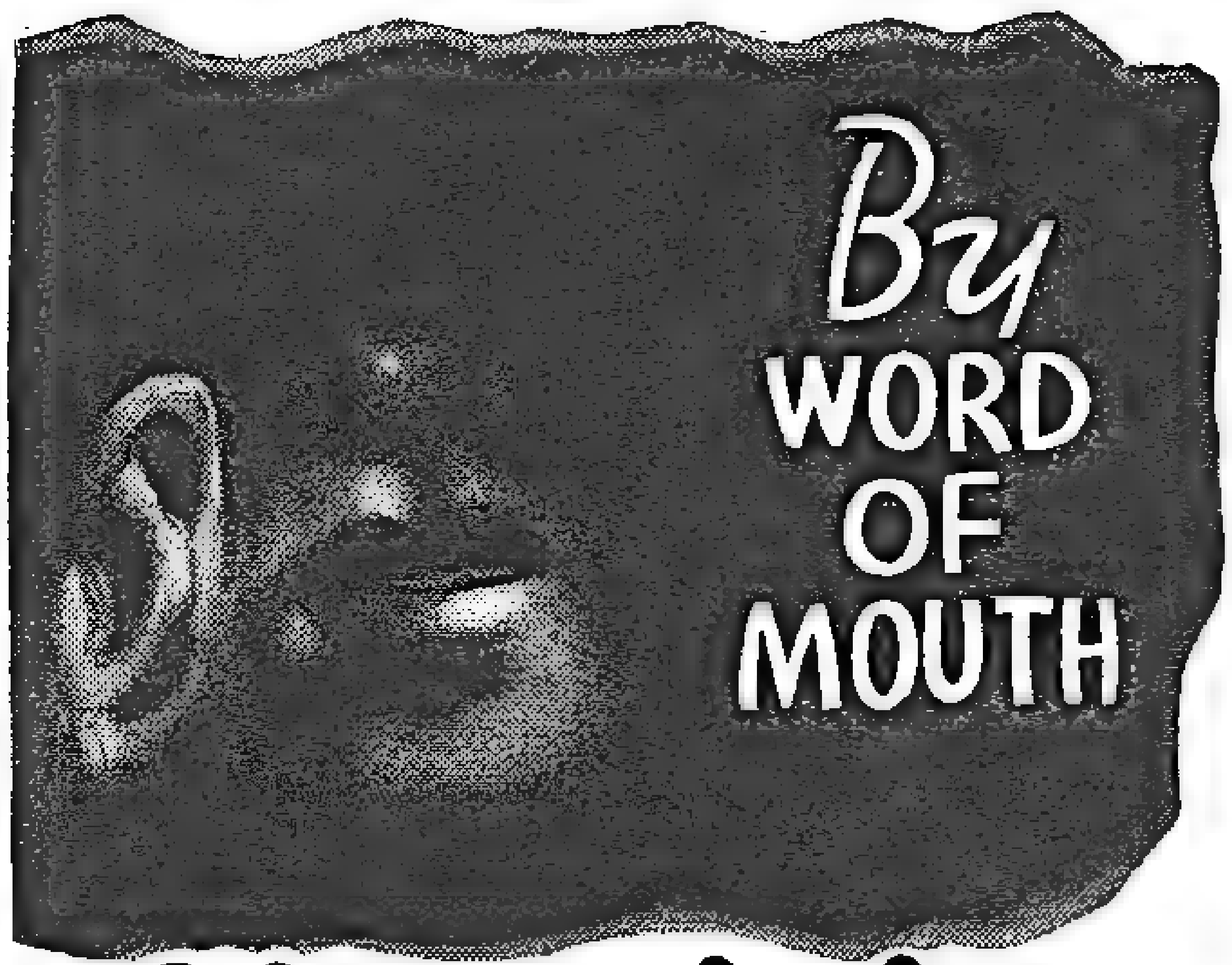

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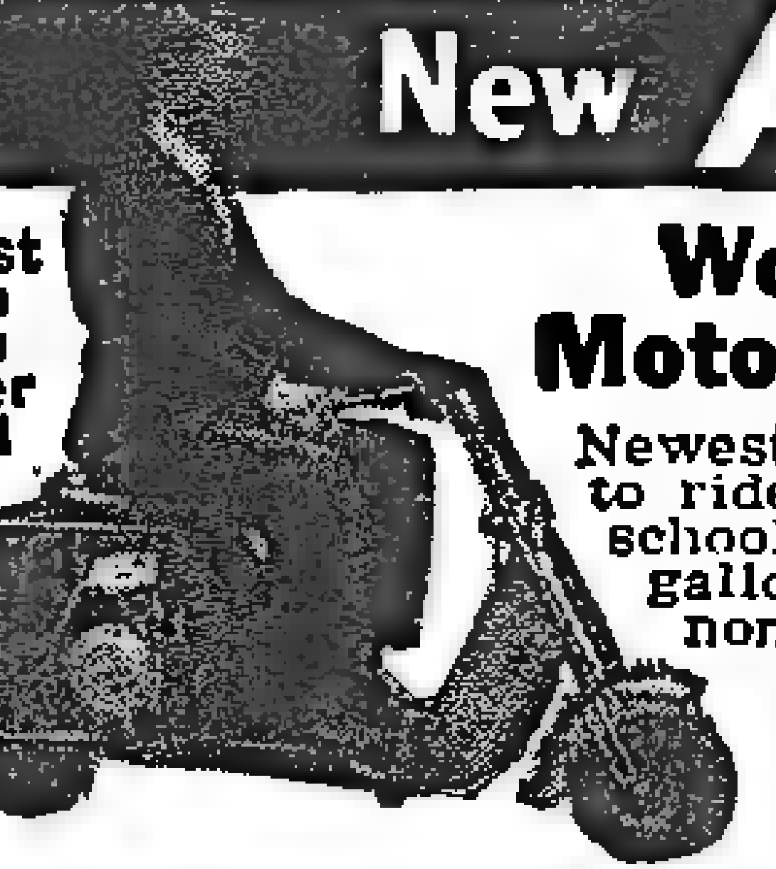

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The Biggest Army

[*Continued from page* 141]

evolution of the last nineteen years, I believe the average military expert would agree that they are precisely the same two which were found in the armor of the Tsars—one physical, the other psychological: the extreme backwardness of Russia's system of communications and the Russian psychology of *Nichevo*, or "It doesn't matter."

Under the dynamic leadership of Lazar Kaganovich, Commissar of Transport, an energetic Jew who for years was head of the Communist party in Moscow (his American counterpart would be a "city boss"), the Soviet railroads are being improved. But his task is a formidable one and will take years for its completion. Russian railroads were always backward in comparison with those of America or Western Europe, and years of revolution and civil war depleted even the poor legacy left by the Tsar.

Rolling stock, so important for moving troops and supplies, is either old or, if new, of inferior quality, and constantly is in need of repair. It is twice as far from Moscow to Vladivostok as from New York to San Francisco; yet this vast area is served by only one trans-continental line.

Nor, save in a few sections, can troops depend on highways for fast transportation. The Georgian military highway in the south is a modern stretch of road, and a few strategic pikes have been built in the Far East. But an automobile journey from Moscow to Leningrad, the two principal cities of European Russia, requires two or three days, if one is lucky enough not to break all the springs on his car. It is a distance which the average American motorist would cover between breakfast and dinner. Roads from Moscow to the western frontier are virtually impassable during certain seasons of the year. The Soviet Union is planning a vast highway-building program—but that is in the future.

The problem of moving armies and their supplies rapidly is perhaps the most formidable one now faced by the Soviet general staff.

Russia's second great military weakness, most observers agree, is psychological. It arises from a certain quality in the Slavic temperament best summed up by the Russian word, *nichevo*. Instances were reported in the World War when Russian troops lost tremendous strategic opportunities because their staff officers were loath to leave a card game or an attractive woman. Never mind! The battle could be fought tomorrow.

Against this *nichevo* psychology, so characteristic of the average Russian, Communist leaders—many of them Jews, Georgians, Austrians and Poles—have struggled constantly. Every effort is being made to inspire the people with a keen sense of competition. It is too early to say whether a basic trait can be stamped out in a few decades. If it cannot, the *nichevo* spirit is an intangible but decidedly negative factor in any estimate of Russia's fighting power.

Fighting Oil Well Fires

[*Continued from page* 119]

flames stood nearly 200 feet high. Clearing away the hot metal from that was a real job. But that Roumanian job was the meanest to work on."

"How did you conceive the idea of shooting out fires by explosives?"

"I didn't. It was a theory of my father's, K. T. Kinley. Floyd and I only improved on it. Dad was an oil field worker in California. He noticed that gas fires had a mixing chamber, a three to 15-foot space between the bottom of the blaze and the mouth of the well, in which the gas and air mixed. He figured that an explosion, set off close to that chamber, would break the gas flow long enough for the blaze to disappear before the gas could resume its upward direction. Sort of 'snuff it out,' as he termed it.

"His problem was to place the shot, and the only way he knew how to do it was to throw it, the jar of landing setting off the blast. The danger of a premature explosion discouraged well owners from letting him try it. But eventually a well he was working on caught fire. Steam and mud had no effect and, because of the danger to other wells ready to come in close by, immediate action was demanded and Dad was allowed to try his idea.

"With a heavy charge of nitroglycerin in a crudely constructed bomb, he approached as near as possible to the blaze. A man with a hose started to keep a stream of water on him, but thought better of it, quit and ran. To have as much getaway as possible, Dad tossed the bomb high in the air and fled. The shot landed square on the well and exploded. The fire was out!"

The elder Kinley retired from active oil field work several years ago and lives quietly at his home at Ojai, near Ventura, California.

Myron Kinley was born near Santa Barbara, California, in 1895 and at 16 started assisting his father, taking up his profession as an oil well shooter, a technical and dangerous work but vital. Five foot 10 inches, and weighing nearly 200 pounds, he is shy and resents any intimation bordering on the show-off.

As a hobby he collects old guns and weapons he has picked up in the wild regions he has worked. Between firefighting jobs he manages his own company in Houston, Texas, and looks after his personal oil production holdings.

Floyd Kinley, born at Bakersfield, California, in 1903, is eight years younger. He followed the profession of oil well shooting under his brother. An inch or two taller, he looks slender despite his 160 pounds. Slightly deaf from concussion around hundreds of explosions, he assists his brother on all fires. His only hobby—as he puts it—is worrying. He resides with his family on his oil lease seven miles northwest of Tulsa.

Also among the half dozen dare-devil fire-fighters is H. L. Patton, of Houston, Texas, who is credited with having subdued more than

[*Continued on page* 145]

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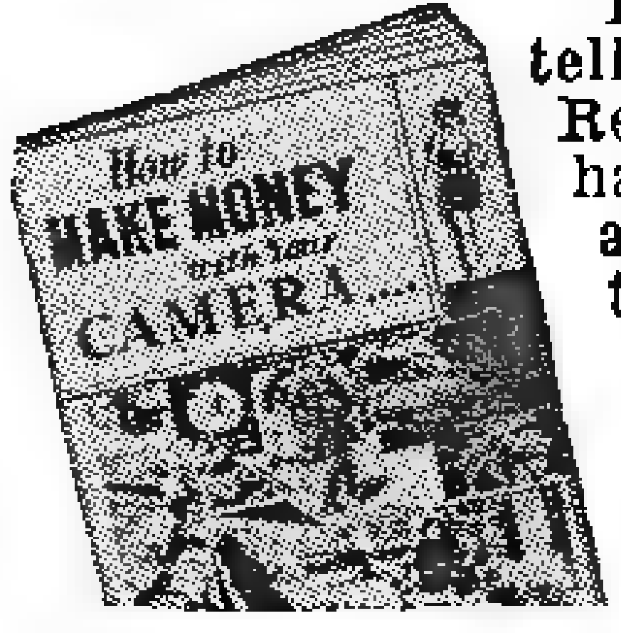

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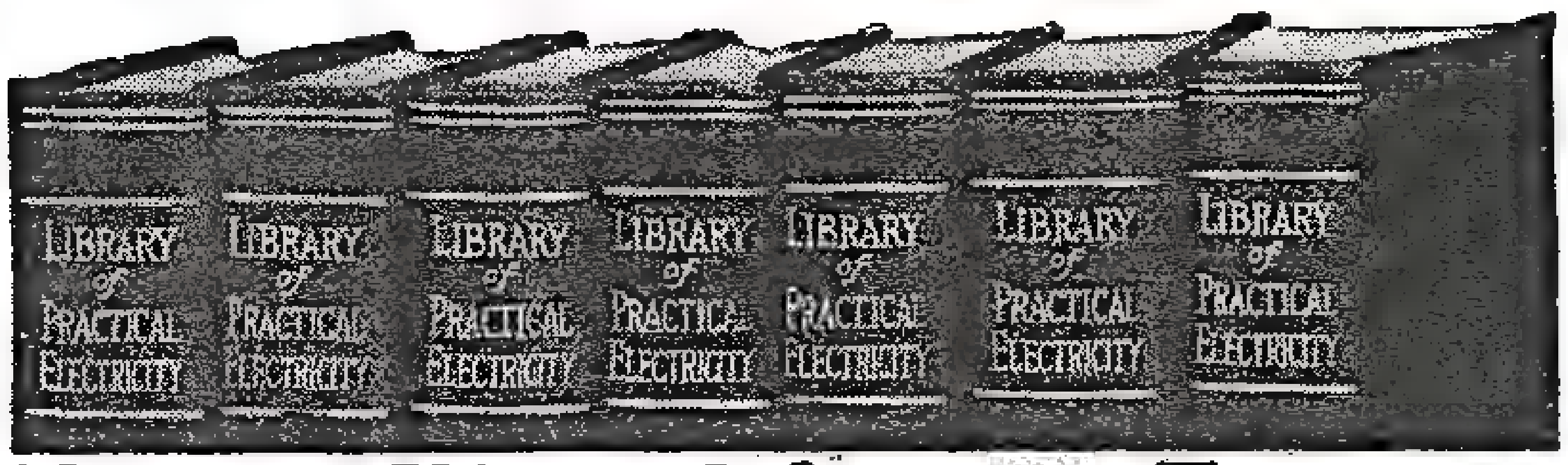

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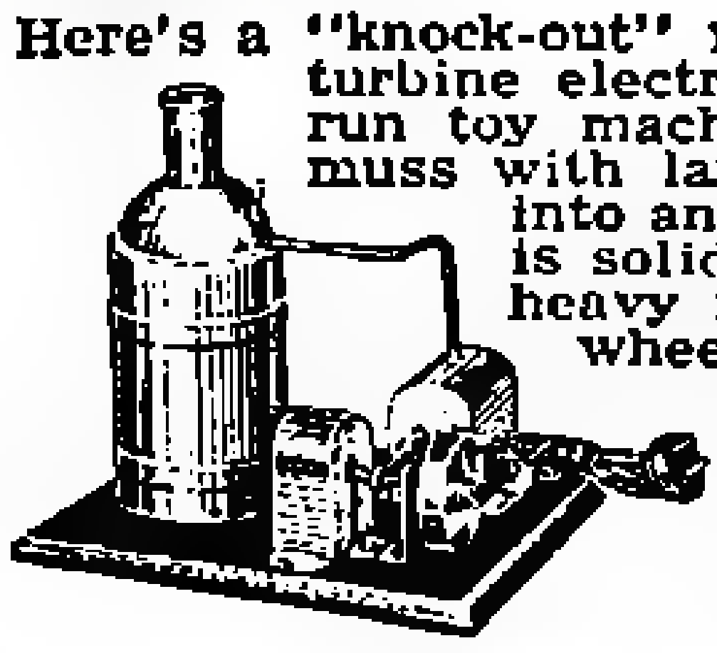

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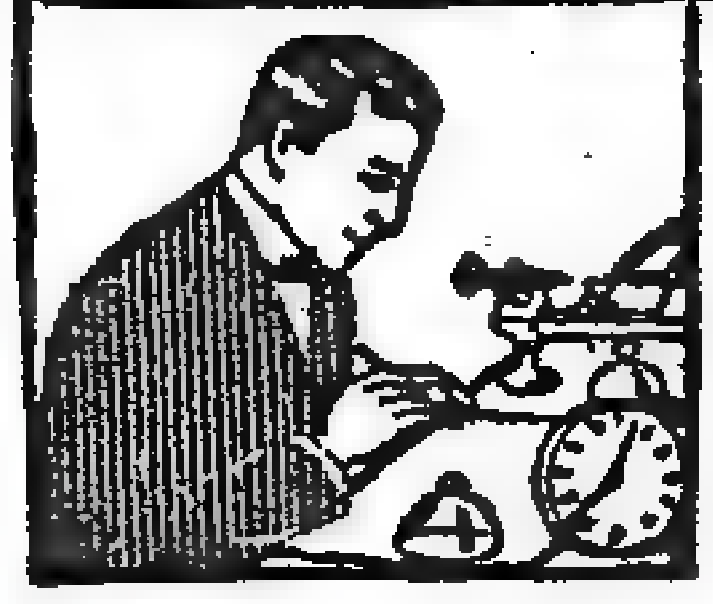

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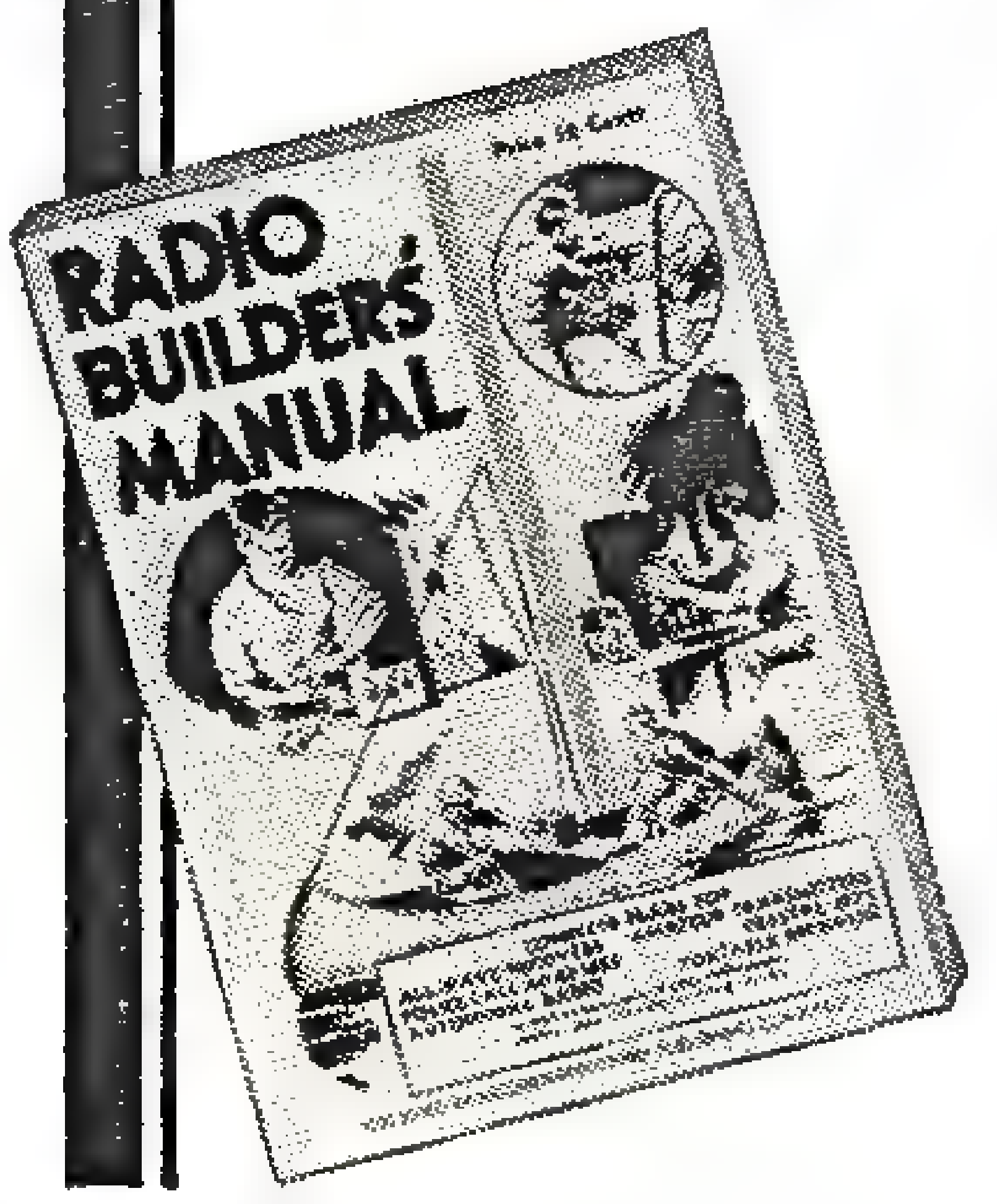

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Fighting Oil Well Fires

[*Continued from page* 143]

100 fires and wild wells in the last few years. A quiet spoken man of about 40, Patton claims he likes his dangerous job, and has fought fires and wrestled with wild gassers all over the country. He subdued a 45,000 barrel wild well in the big East Texas field, capped an outlaw in Wyoming when the temperature was 45 below zero, and has entered craters after derricks and all riggings had been swallowed.

One of Patton's last spectacular jobs was on a burning well within the city limits of Corpus Christi, Texas. The roaring fire threatened other wells and parts of the city. Two men were burned to death and two others hurt.

Through such infernos Patton only once sustained serious injury. Fire broke out behind him after he crawled into the derrick floor of a wild well on the Texas coast in 1935. Out of sight of his helpers, who were unable to turn water on him, he was forced to fight blindly through the flames. He was badly burned but ready for another fire within a few months.

"I sort of like a good fire," he says.

Another famous and stout-hearted oil well tamer is John W. Gordon, a Cherokee Indian who lives on a placid farm at Choteau, Okla.

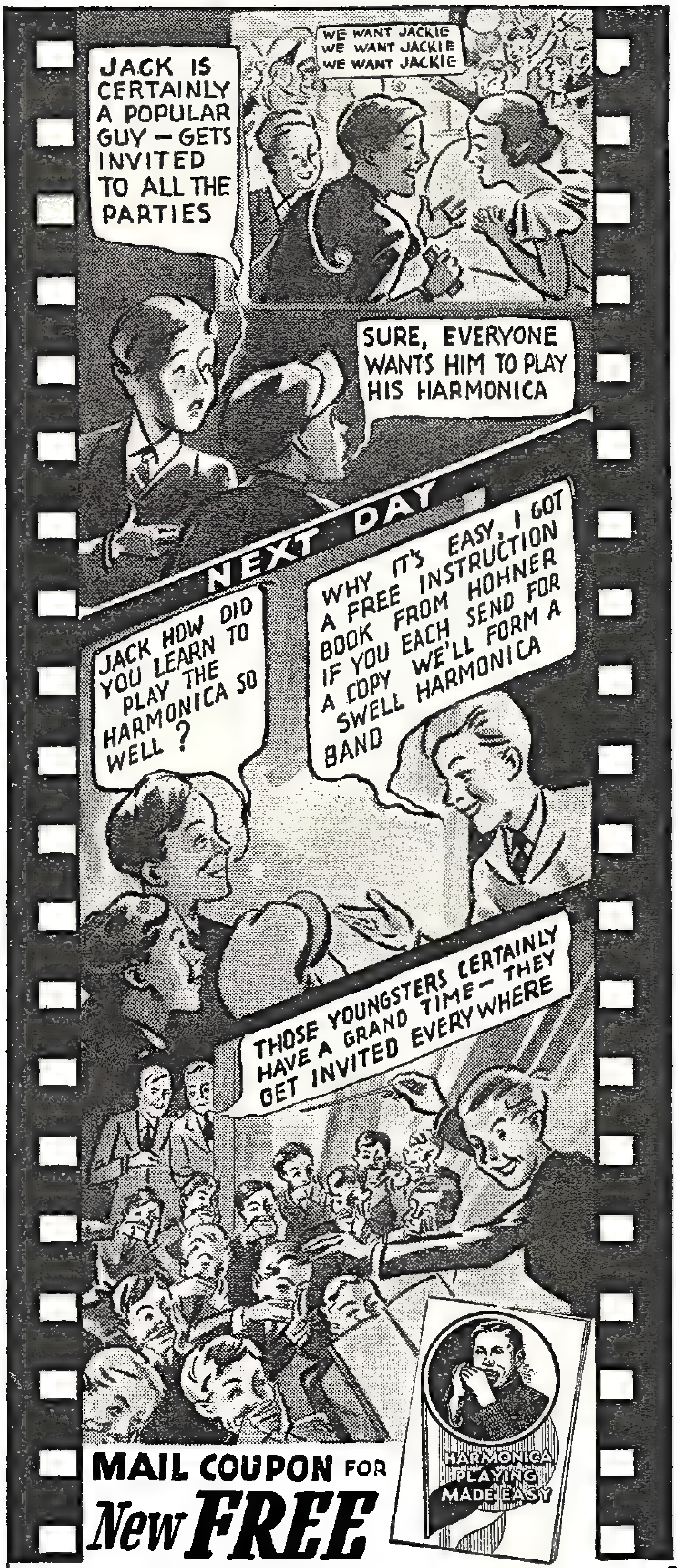
During the early days of the Oklahoma and Texas fields when he was a roustabout and connection man—one who works with a special crew connecting wells to pipe lines and storage tanks—two big wells blew in wild. Each ran about 25,000 pounds, with 60,000,000 feet of gas, spraying homes with oil, and endangering the lives of hundreds of people. Gordon volunteered to tame them. He organized a crew consisting of two boys and subdued the smaller well within three days, and the larger, the Mary Sudick, in 11 days.

When the big Morgan Stout well later went out of control and menaced the east part of Oklahoma City and the State Capitol itself, Gordon was again summoned and succeeded in conquering the giant after a breath-taking battle. Gordon subdued many other wells, but he has learned from long experience that oil wells are like lions—the wild ones look mean but it's the tame ones that get you.

Not long ago while doing a small job on a tame Kansas well he was suddendly knocked down by a chain that broke. A piece of the chain hit him on the leg, and complications resulted that kept him in bed for several months.

"My advice," he says "is to watch the wild ones, but be even more careful of the tame ones."

Others who have risked their lives in dangerous infernos are Ford Alexander, of Whitter, California, who has had many narrow escapes in the Coast oil fields, and W. A. (Tex) Thornton, who, after winning wide fame in fire fighting, is now operating his own torpedo company at Amarillo, Texas. Next to the Kinleys he is probably the best known among the old-timers.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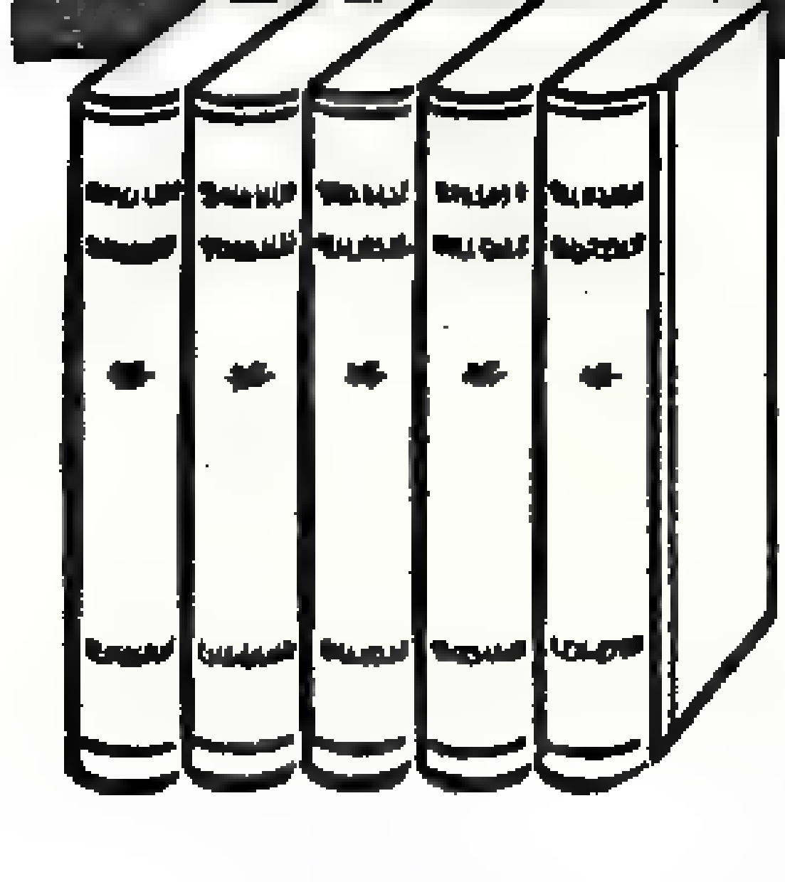

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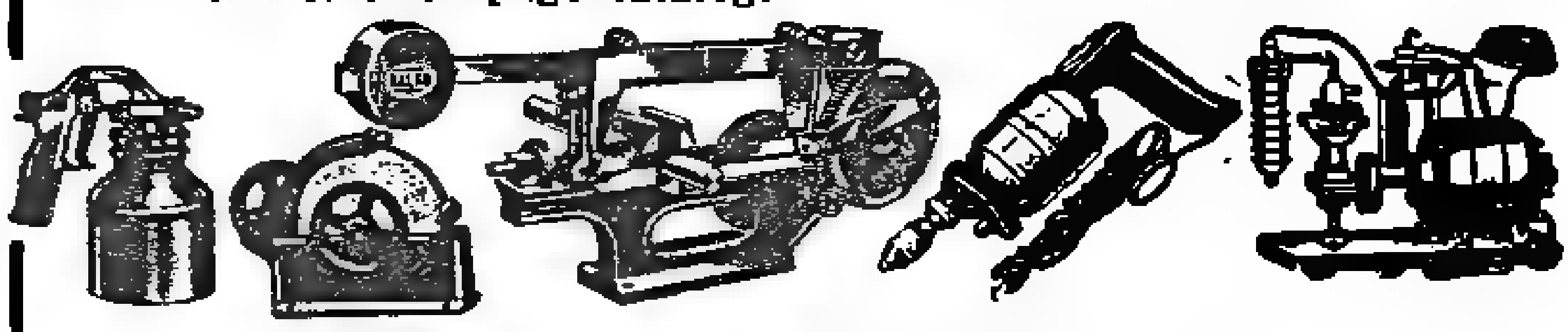

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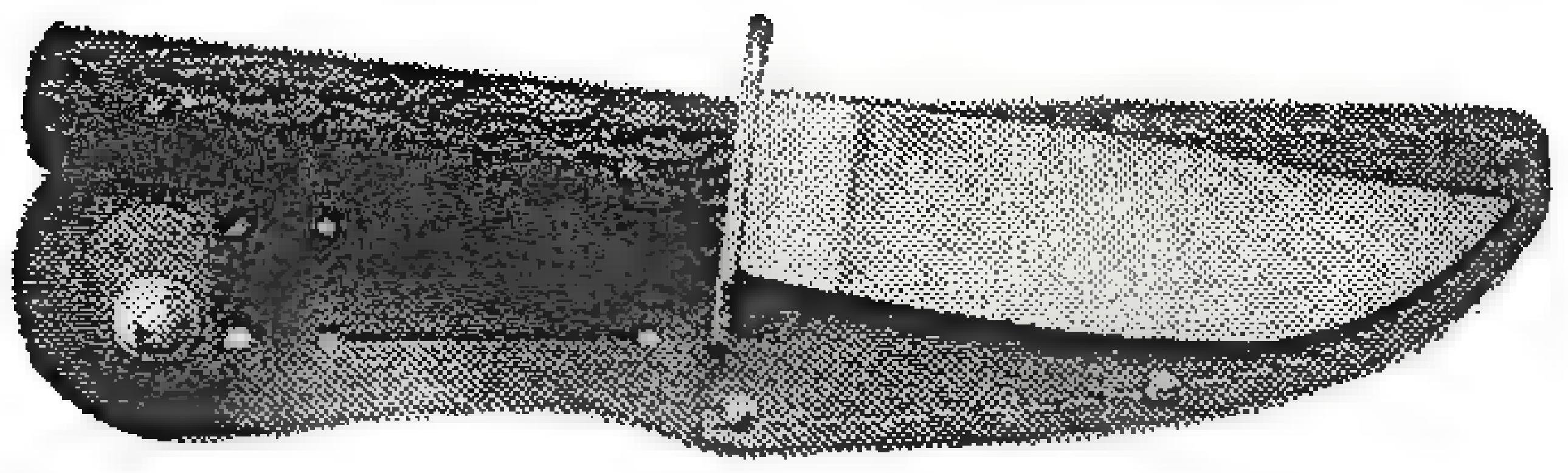

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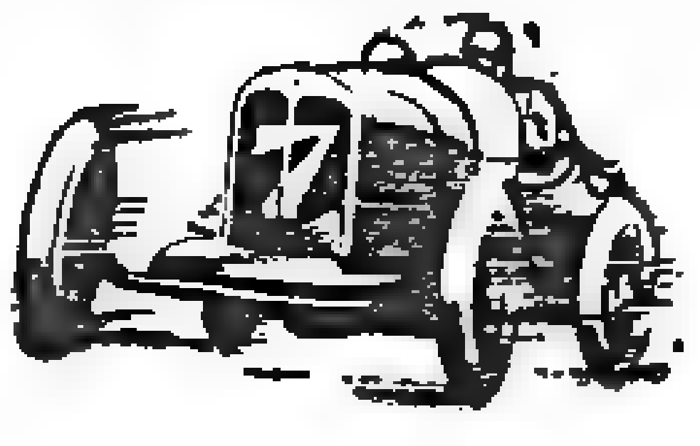

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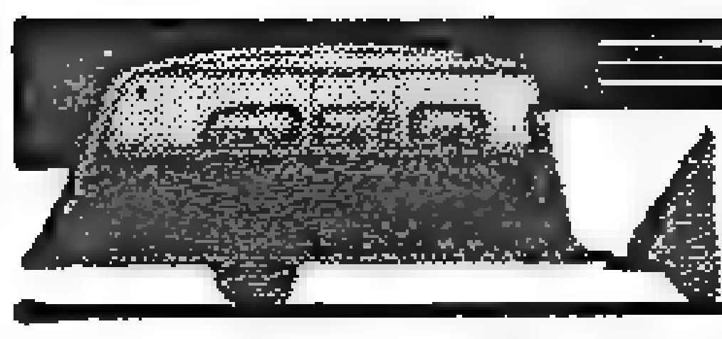

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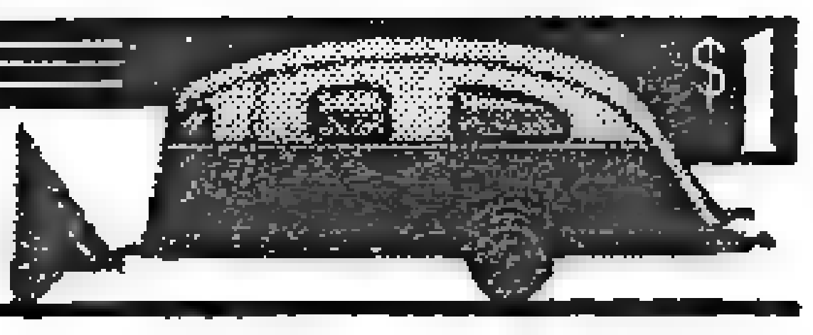

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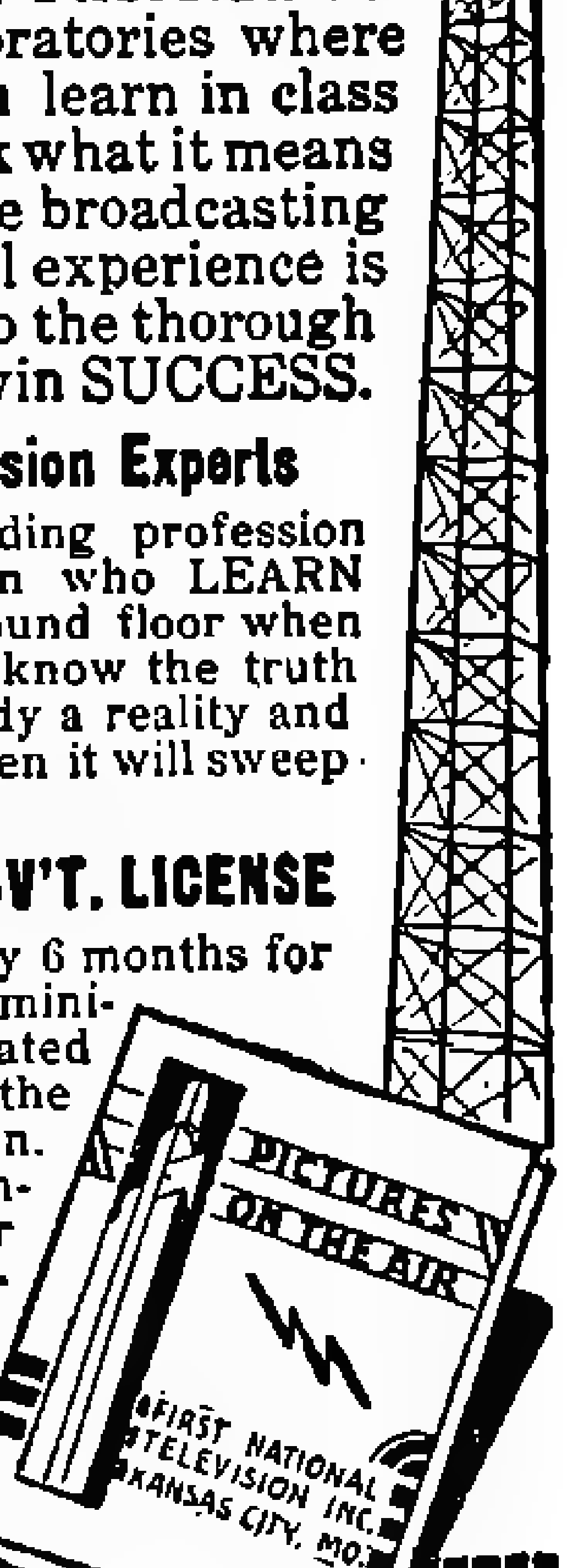
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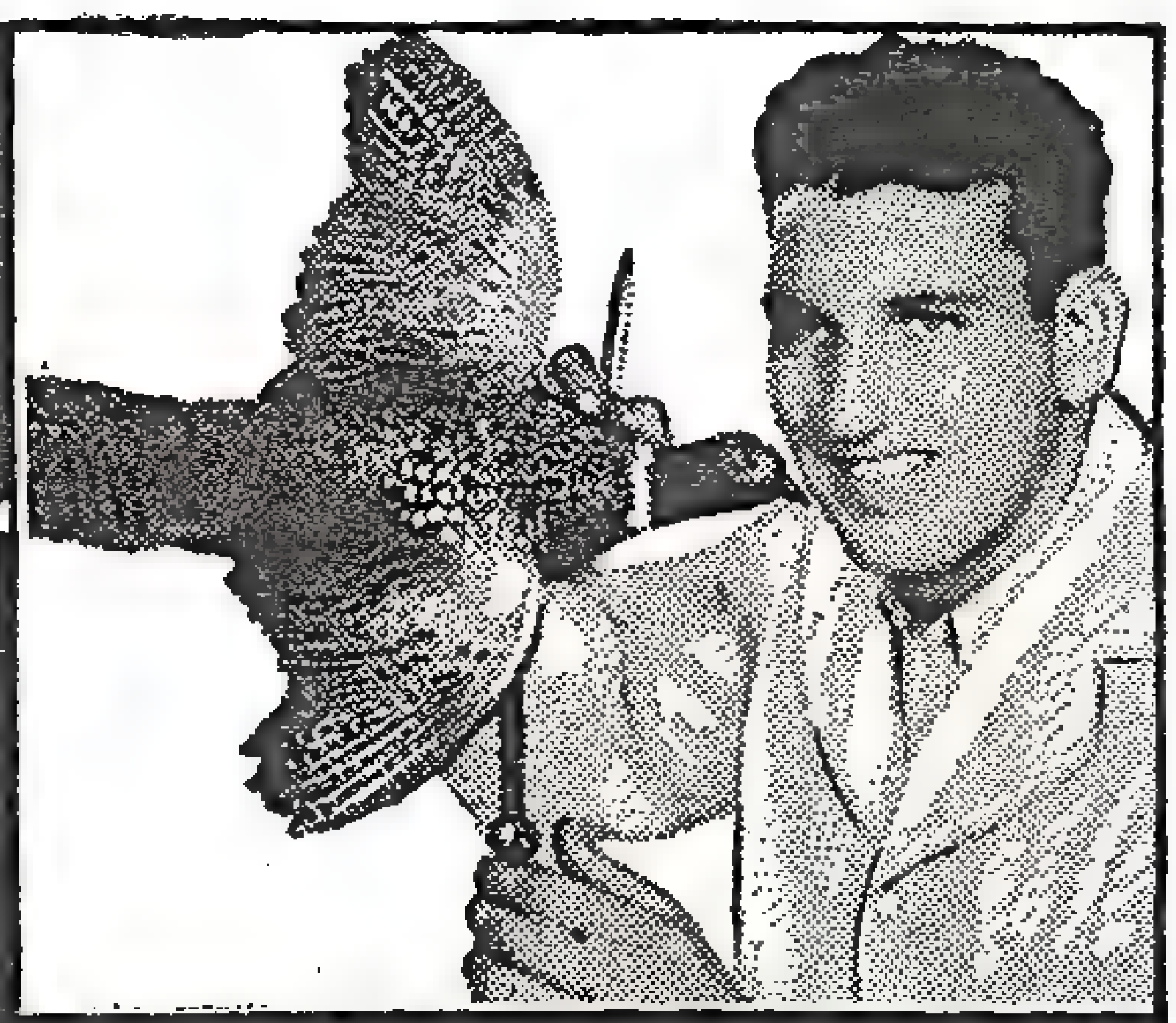

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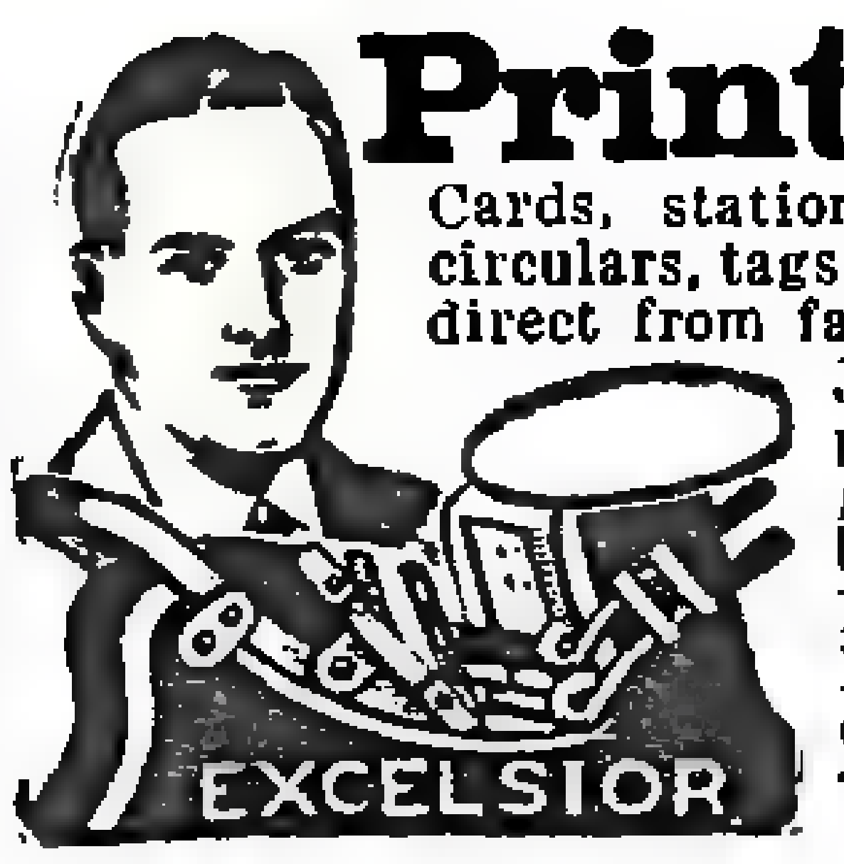

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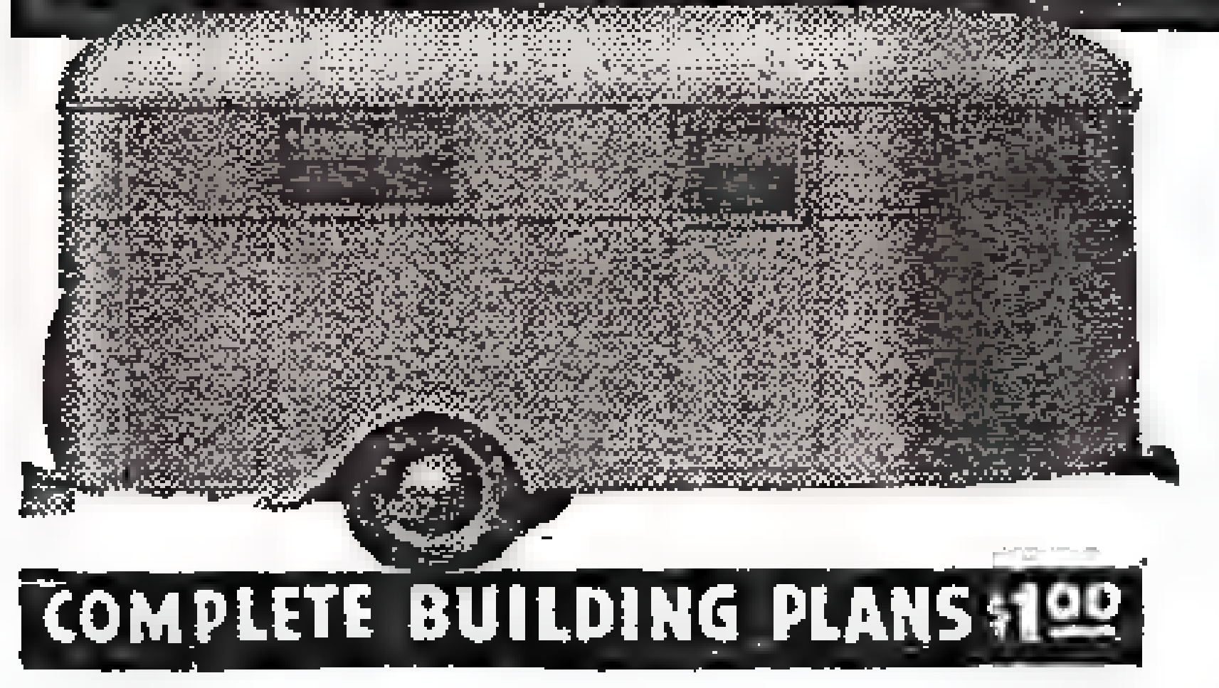

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Dr. Elihu Thomson, Inventor

[*Continued from page* 126]

The mental flood-tide has continued throughout Thomson's eighty-three years. None of the "sons of Tom in science" was ever more prolific of ideas than Elihu. Only a few years after his alternating-current contributions, he produced the first practical wattmeter in this country, and which even today measures your electrical consumption. For this he shared with Aron, a European inventor, the Paris prize of 1890, amounting to 10,000 francs. We owe thanks to Prof. Thomson for the modern arc light that still lights many city streets. He has dominated the development of turbo-generators.

Other of his great inventions include the high frequency dynamo; his oil-immersed and oil-cooled transformer, and his useful—in fact, indispensable—constant current transformer, a further application of the repulsion principle. Aside from the electrical field, his work with fused quartz may be noted, especially its application to astronomical mirrors; his continuous centrifugal separator, leading to the centrifuge; and his fluid pressure engine (later introduced commercially as the "uniflow engine."

All these inventions and discoveries, and others extending down to his last patented invention of 1935, are practical ideas that have come forth from the thinking and experiments of this single technician. His inventions have caused the issuance of 700 United States patents; but to him the patents have held a minor interest by comparison with what he calls "that joy of joys—the joy of achievement." Well has he practiced his favorite motto: "Prove all things and hold fast to that which is good."

It was largely through the foresight of Dr. Thomson that the Thomson-Houston Company united with the Edison General Electric Company to form the present General Electric Company. In the consolidation Dr. Thomson agreed to take charge of the large laboratory at Lynn, Mass., which was renamed the "Thomson Laboratory." Here he has remained ever since, still actively inventing.

Dr. Thomson's latest invention relates to improvements in electric refrigerators.

Probably no living man has been more honored than Elihu Thomson. He has been awarded fourteen outstanding medals, decorated by all leading countries, awarded honorary degrees by such institutions as Yale, Harvard, University of Pennsylvania, and also Victoria University, at his birthplace in Manchester, England.

Despite his manifold practical activities Dr. Thomson has found time for various hobbies. He is an ardent student of astronomy, an "amateur" he calls himself—yet recently he supervised construction of the fused quartz disc for a 200-inch telescope!

Dr. Thomson served three years as president of the Massachusetts Institute of Technology. To this day he is a director of the Institute.

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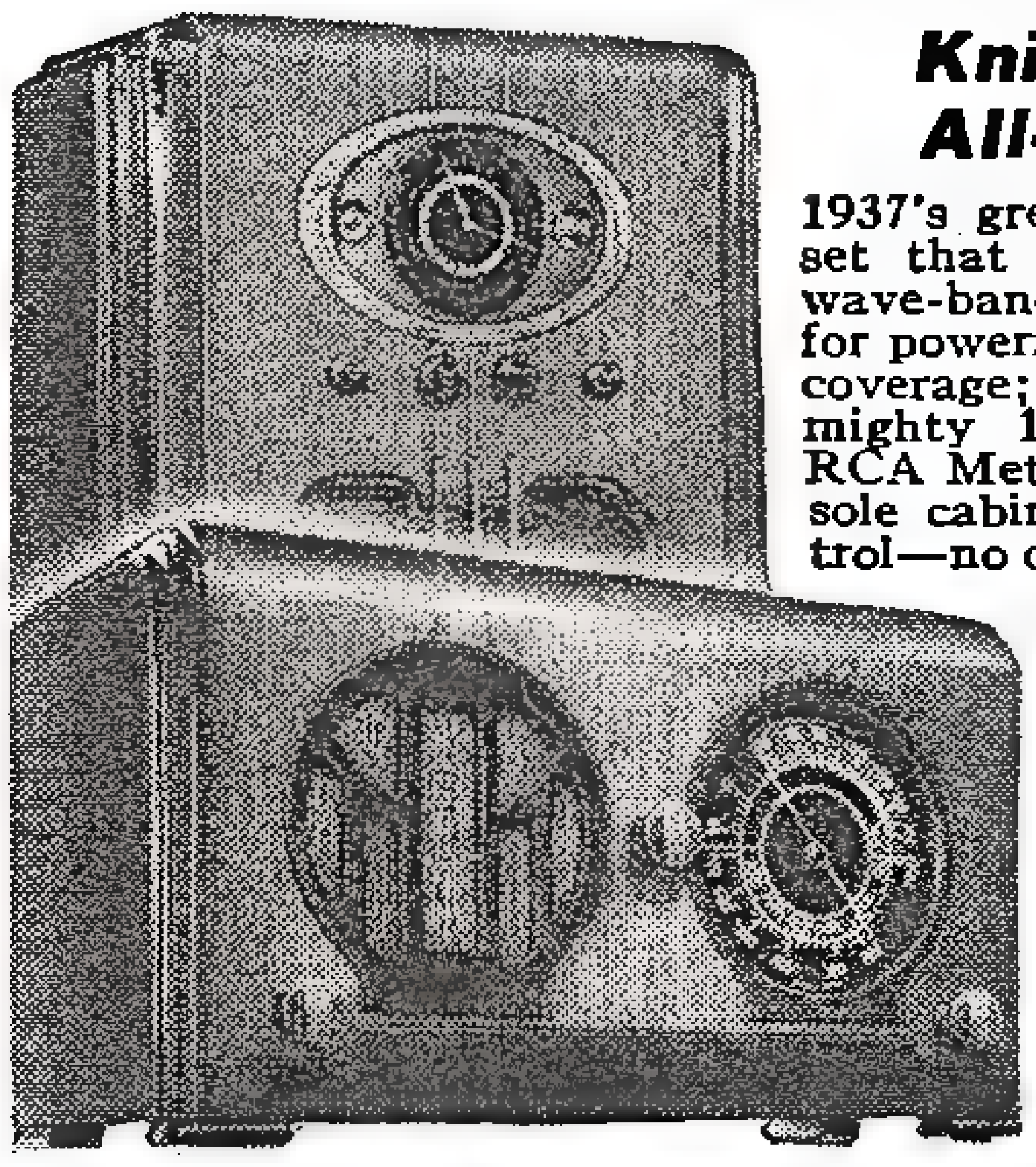

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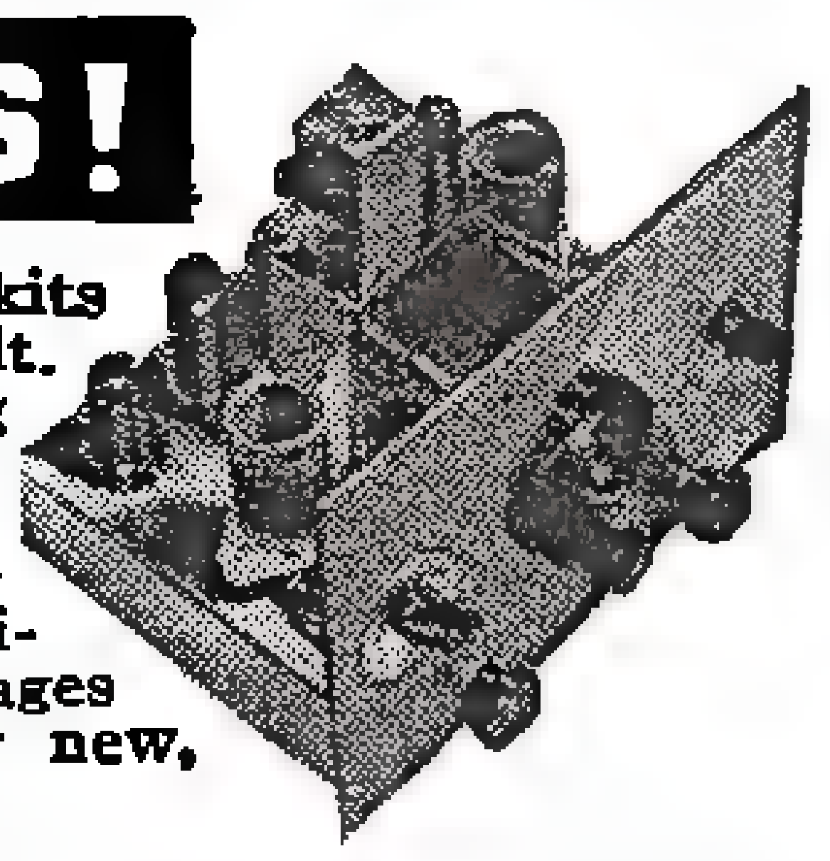

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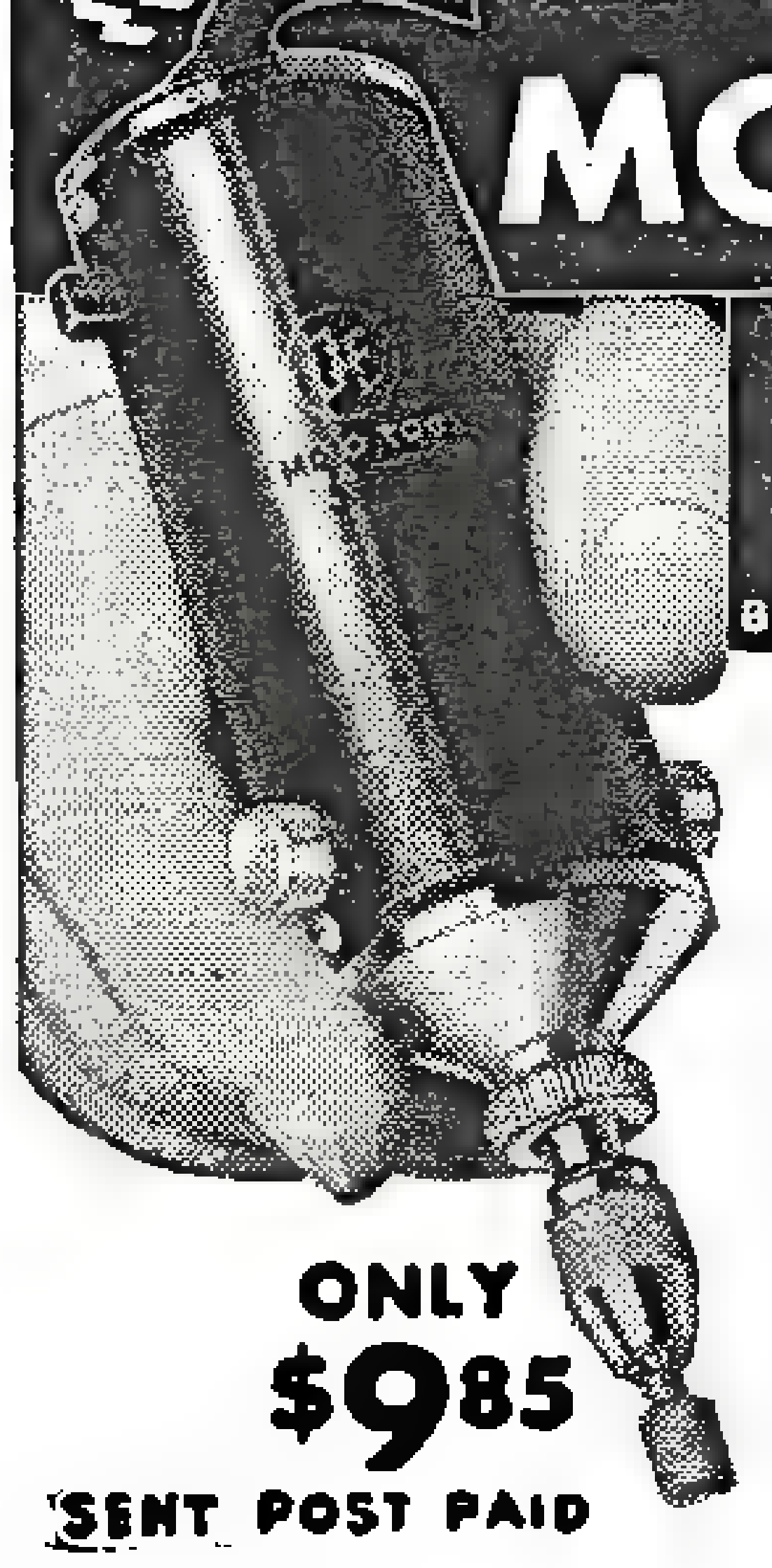

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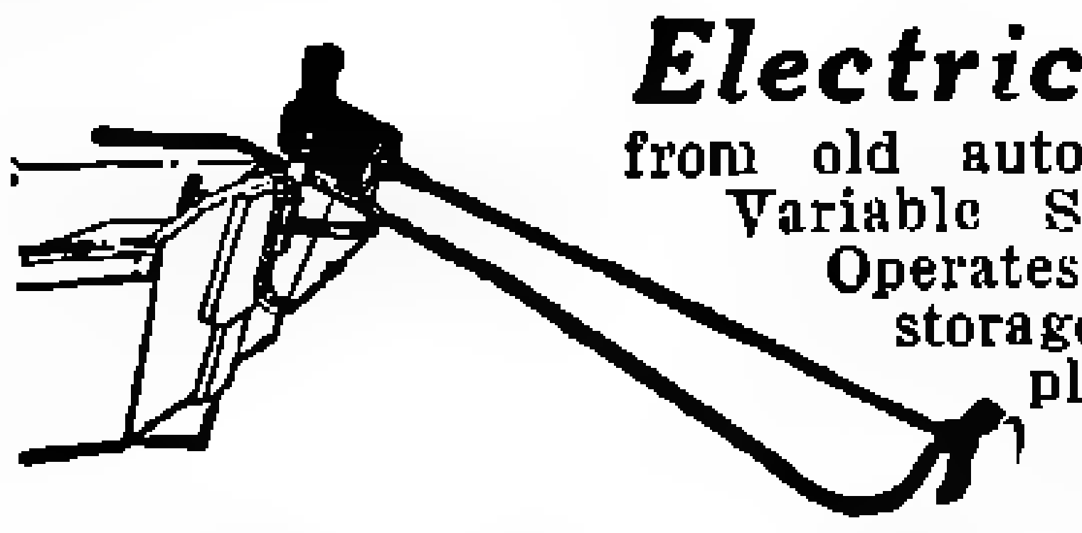

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A Modern Desk Typewriter

[*Continued from page* 122]

The slide rod is fastened to the drawer with ten-penny nails. Drill holes for the nails to prevent splitting and place a 5/16" high pile of 3/8" washers between the rod and the side. The hooks are morticed into the side, so the hooks will just catch the rod and swing the drawer. Adjust this and then bolt in your hooks as shown in Figures 8 and 8-A.

Build the supply shelf so it fits easily into the space allotted. The horizontal divisions are fastened with dowels which run from one to the other through the vertical piece. The vertical piece is fitted with dowels which have small springs in back of them. These loose fitting dowels will then be pushed into holes, but not until after the desk has been first given its enameled finish. This method of fitting makes the painting much easier.

A little mechanical work still is necessary. Place the doors and drawer fronts with fine brads, see that they check for straight lines, locate the hinges then just above the hinge on the copy side of the door put a small strip for holding copy A friction cupboard catch holds the door in position. Place it on one side of the door so it does not interfere with the copy. The spring catch portion is put to a mortised spot on the bottom of the typewriter drawer.

The front of the stationery drawer is now nailed in place. The supply door is made in one piece, to save time, with the hinges located under the door and fastened to the door strip.

Mortise the file lids for hinges and fit as outlined in Figure 11. As they are only intended to hold folders and similar light material, their construction is sufficiently strong. Cut a piece of tin to the pattern in Figure 11 marked *envelope holder*. This is fastened to the front of the file pockets, which are wider than necessary for folders. The metal is easily bent with pliers and a piece of wood. Finally see that the leave pulls easily allowing for several coats of enamel.

The handles in Figure 10 are made from standard 5/16" hexagon brass. Two are 3½ inches long and two 4 inches long. File slight bevels at the ends and drill holes for escutcheon pins. A ½" pile of 3/8" copper coated washers is used to keep the bar from the desk. This makes a simple and quite modernistic handle. These simple handles do much to set off the desk.

In enameling the desk, which was mentioned previously, first sand down the finish off the wood until it is perfectly smooth. The enamel should then be applied according to the instructions on the can and allowed to dry. Rub down the first coat with pumice or rotten stone and light lubricating oil and apply a second coat of enamel so as to secure a mirror gloss.

The decorative lines running around the desk are made by filling in the saw cuts with plaster of Paris into which has been mixed equal parts of whiting and alumninum bronze powder.

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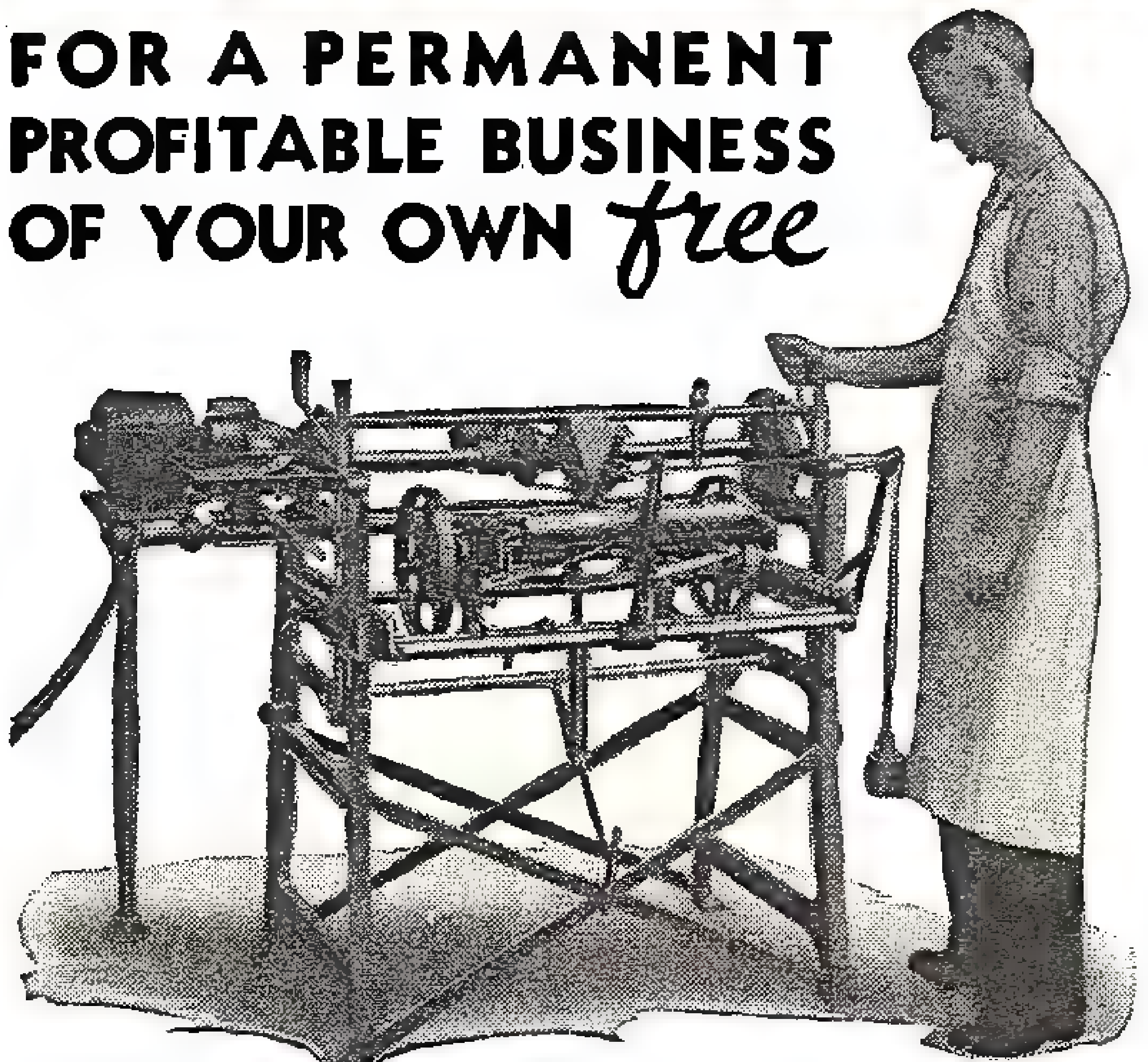

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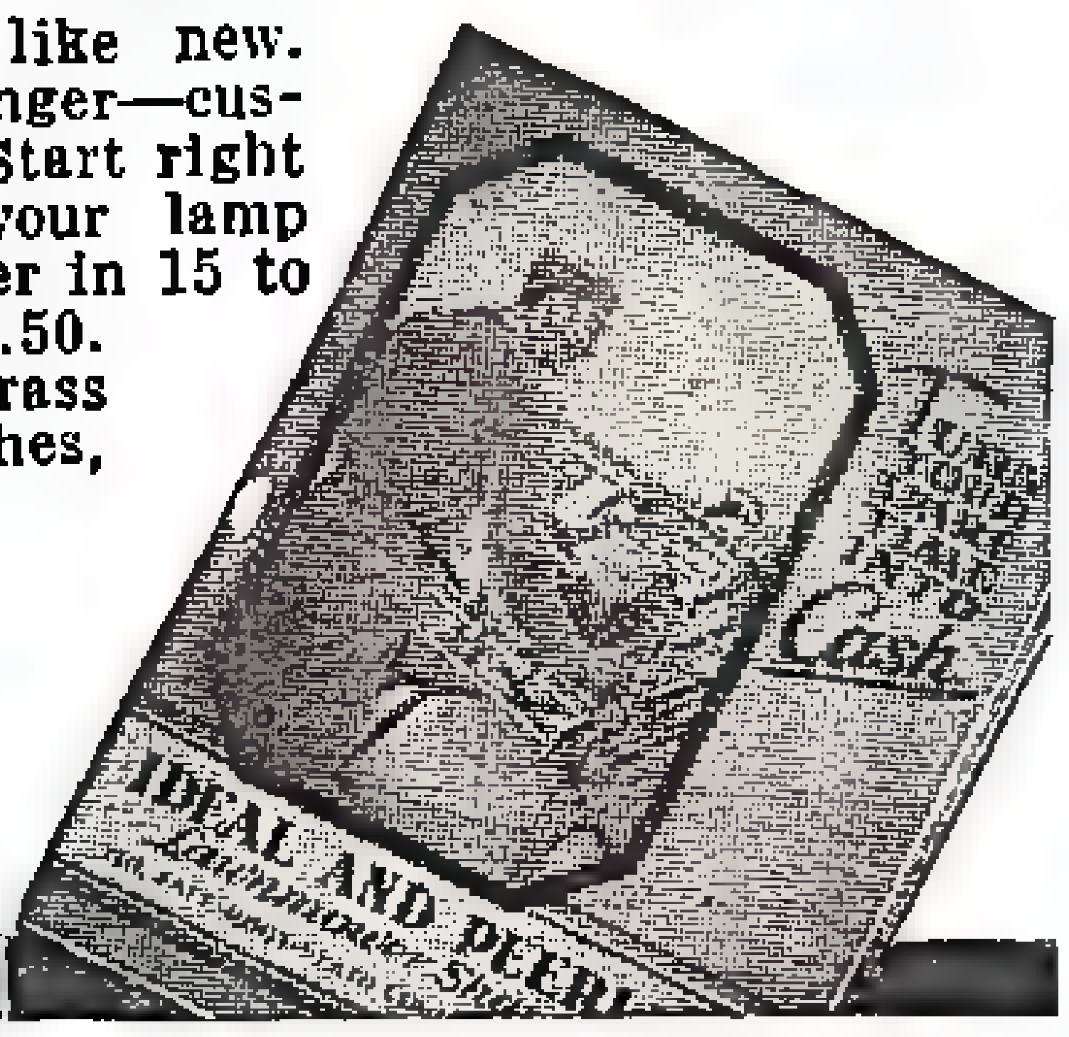
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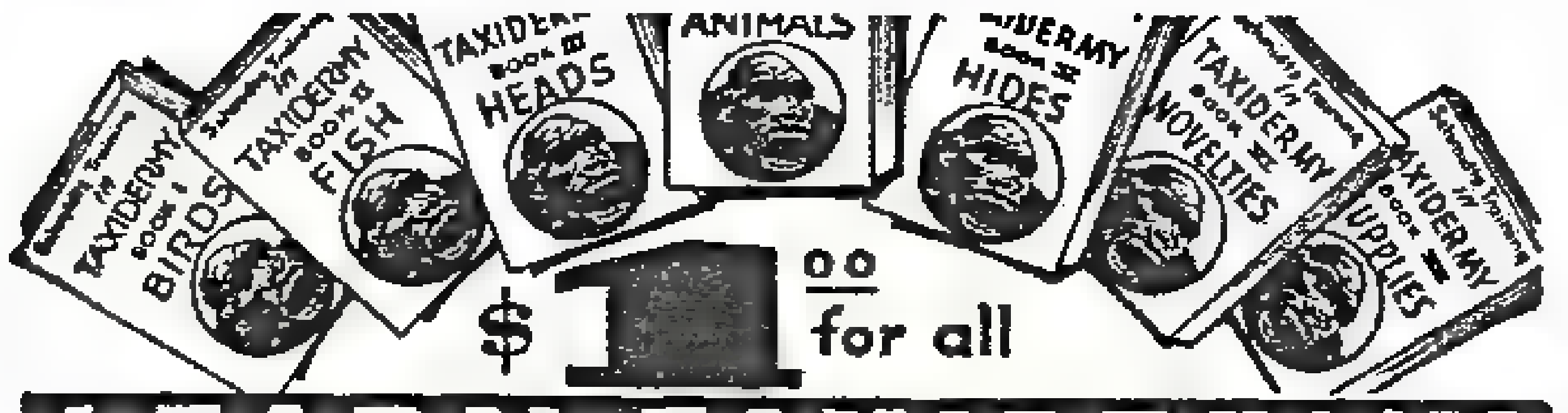

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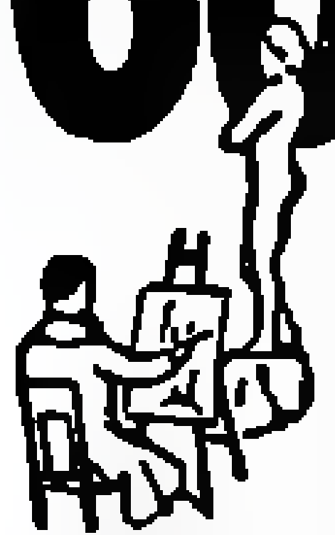

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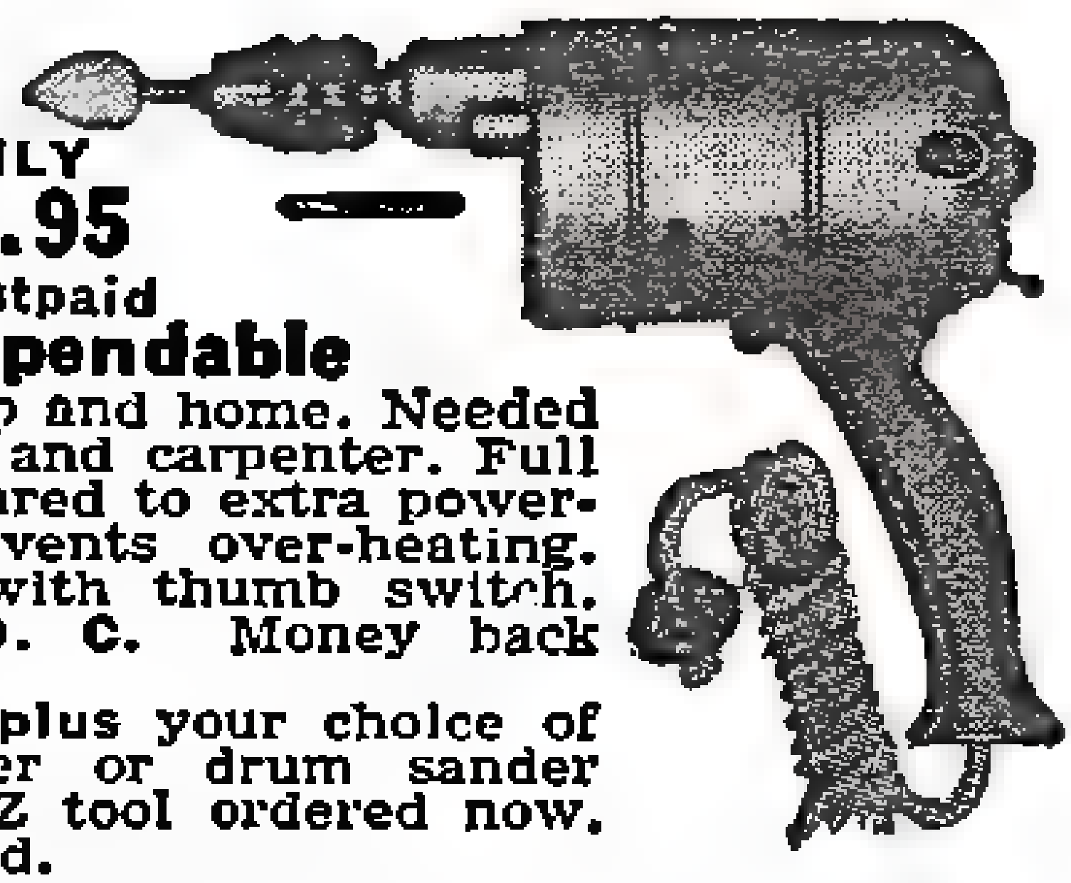

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Collectors Vie for Banks

[*Continued from page* 135]

head moves up and down; the child kicks its feet, and the coin drops from the spoon into the child's mouth.

Mr. Hallett's prize bank is a chanticleer in Italian Delft ware, claimed to be over two hundred years old. Another Delft ware bank is a Dutch shoe. Mr. Hallett has accumulated enough buildings for a whole village complete with church, armory, jail, bank building, houses, barn and garage, trolley cars and horse cars, a locomotive, a town clock, and the town loafer—a ragamuffin darky sitting on a bale of cotton.

It can be readily understood how many of the mechanical banks might have fascinated children into depositing coins just to see them work. In a small Bunker Hill monument a coin is inserted at the top and runs down a winding sluice into the coin receptacle at the base. "Prof. Pugfrog's Great Bicycle Feat" consist of placing a coin back of the wheel, then pressing a lever, whereupon the wheel revolves and tosses the coin into the receptacle at the front. "William Tell" shoots the coin, which is placed on the gun, at the apple on the boy's head. An unusual bank, the only one of its kind, so far as collectors can find out, is the "Kick-Inn," in the shape of an inn in front of which is a mule which kicks the coin into the house.

The "Kicking Cow" is both a bank and a mechanical toy. At the pressure of a spring, the cow becomes fractious, kicks out a leg and knocks over the boy who is doing the milking.

Of course, Uncle Sam appears in various types of banks. In one, the tall figure in high hat and striped trousers wags his goatee as he drops the coin placed in his hand into a carpet bag.

While collectors of these banks have not yet gained the point where they grade this new form of Americana as "first-," "second-period" American, etc., many banks by the material of which they are made, or by costumes or some hint of an historical event, indicate their own periods.

Besides many small collectors, there are about twelve outstanding collections of juvenile banks in the United States. This collecting hobby seems to be particularly strong in the New England States, but people all over the country are becoming interested. A prominent Pacific Coast collector is F. W. Wieder, of Berkeley, California.

Prices of coin banks depend upon rarity and upon the desire of individuals to possess the banks. Some mechanical banks listed in the old manufacturers' quotations to sell to the trade at $5 to $10 per dozen, today are sometimes quoted as high as $25 to $35 apiece. Prices may have the very wide range of from $1 to several hundred.

One big collector recently received a letter from a woman offering a very good bank for $20. He wired her to send it C. O. D. and in reply received a letter saying she had had many good offers, and was jacking up her price. In the end the collector paid her $75 for it.

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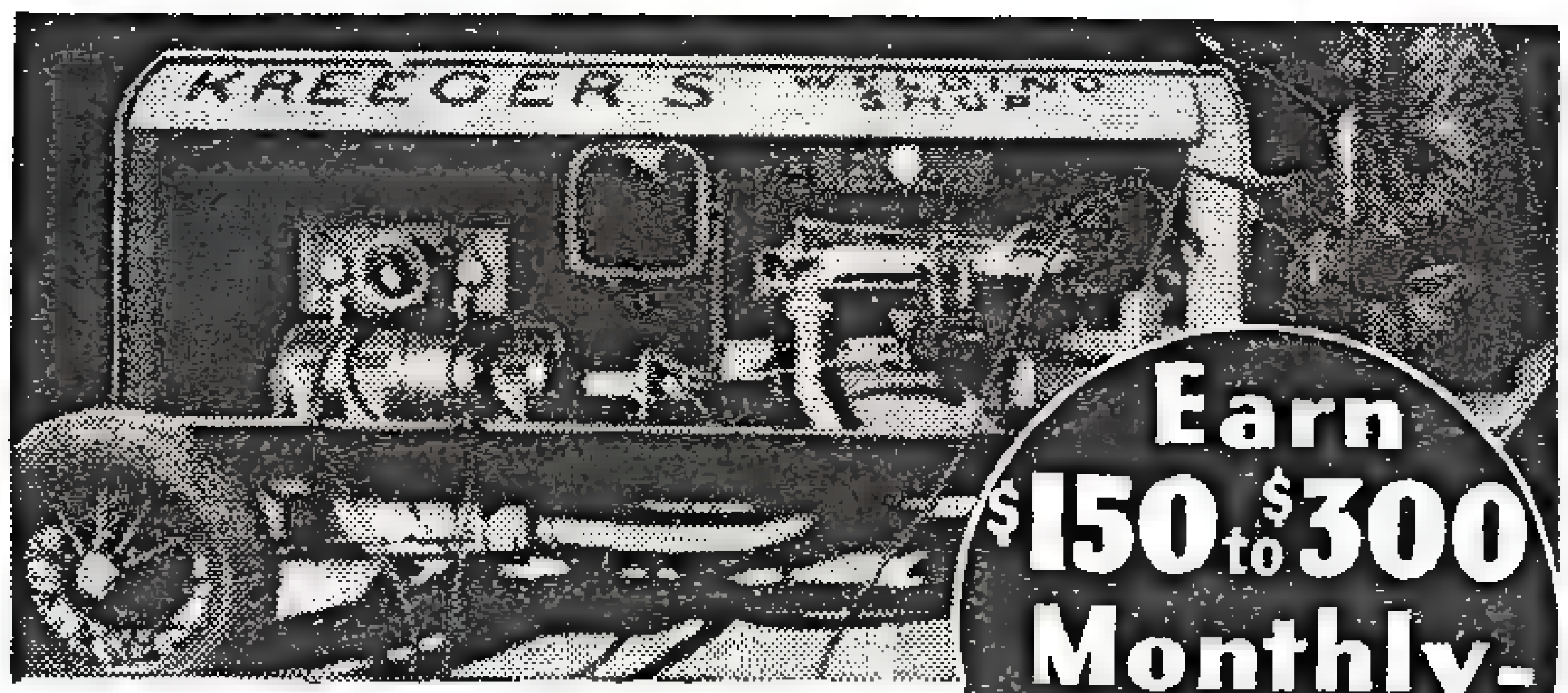

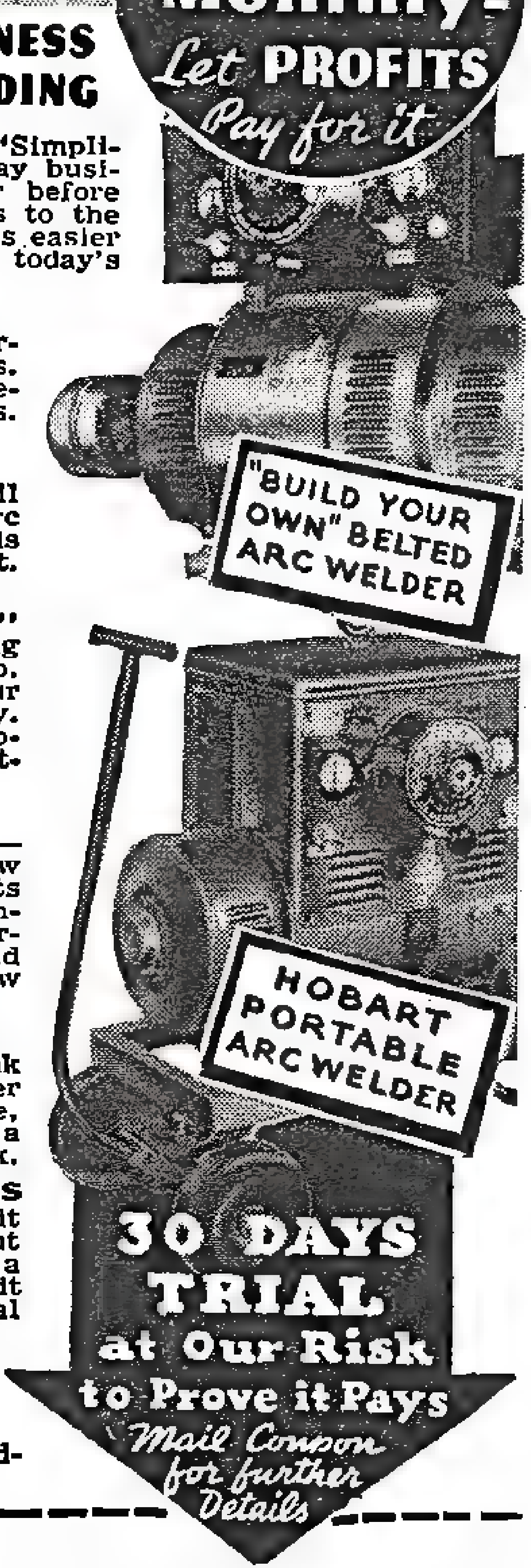
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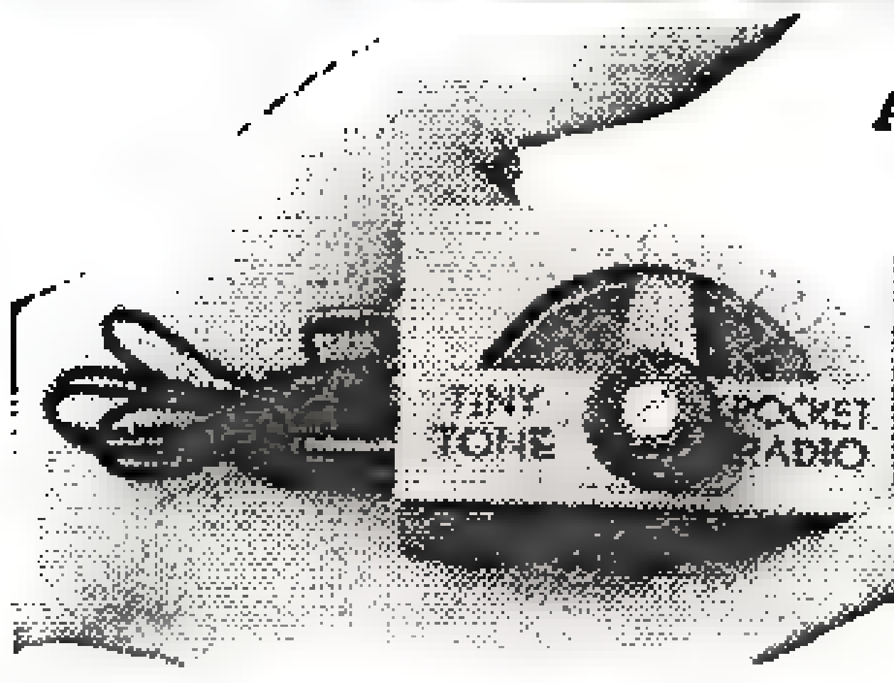

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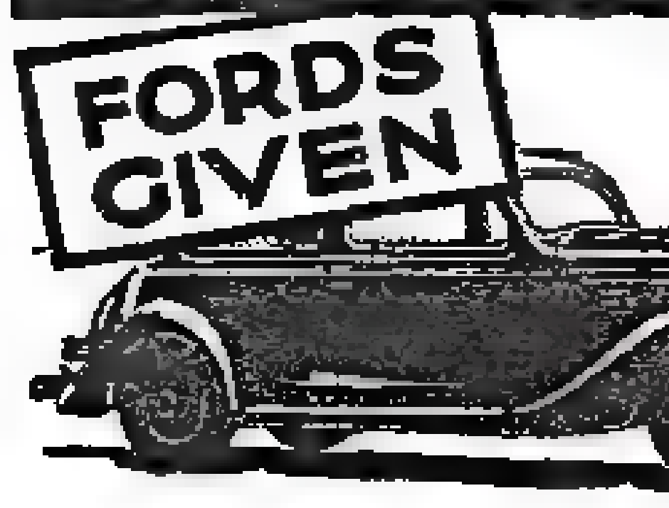

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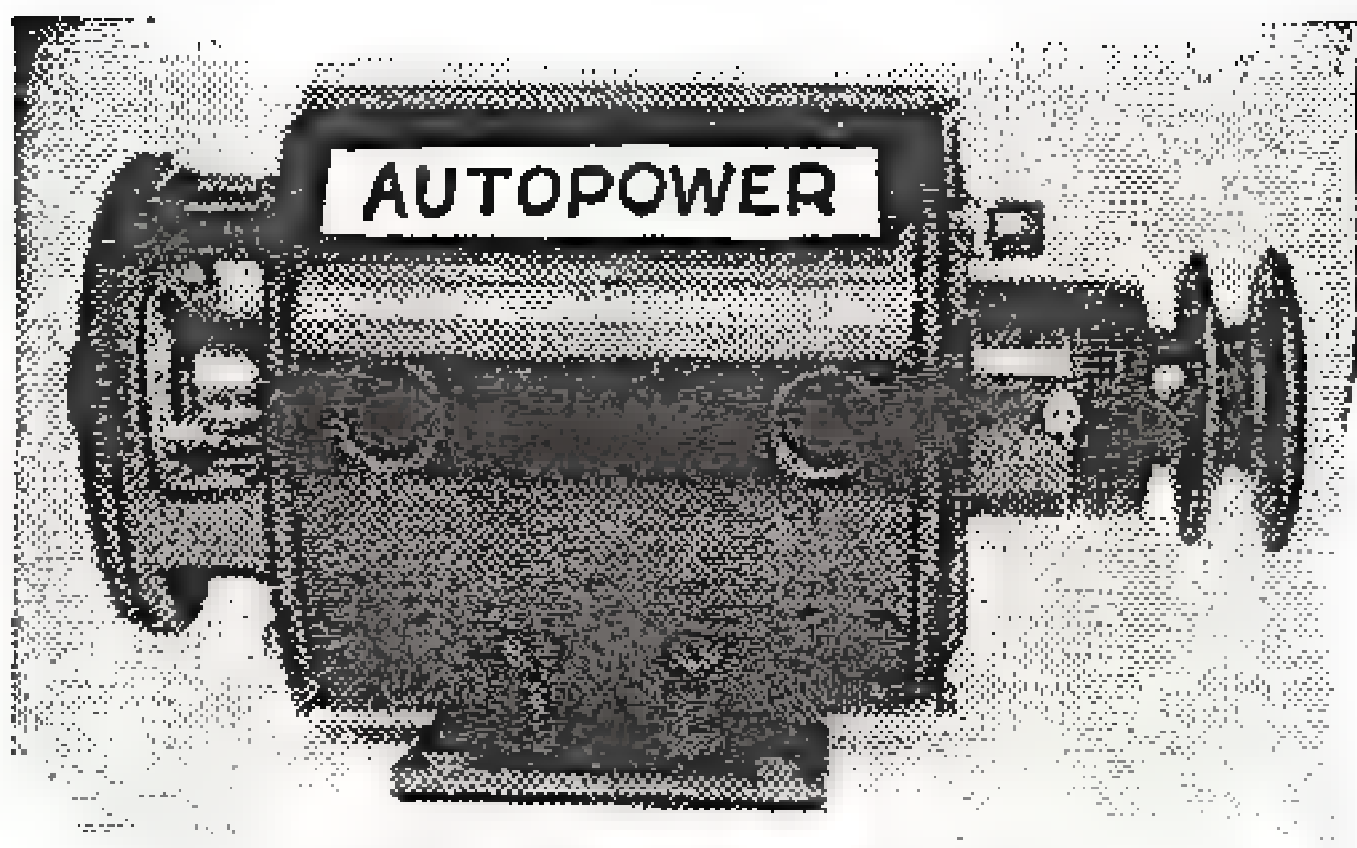

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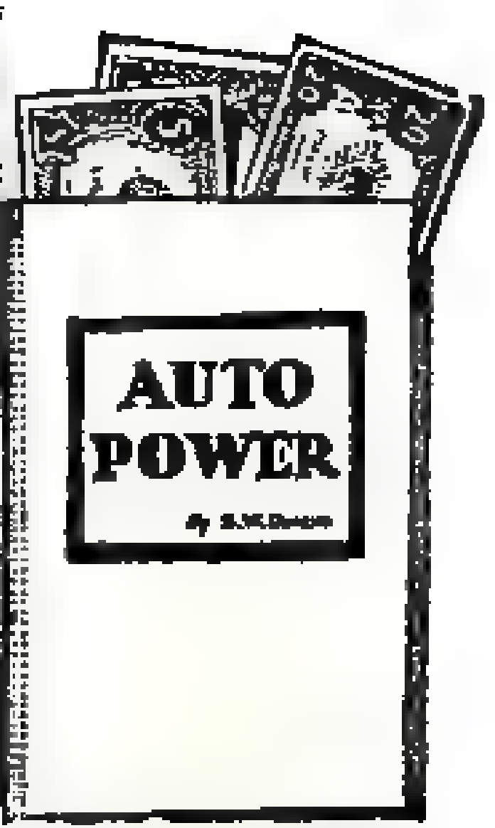

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Romance Of The Tin Can

[*Continued from page* 132]

canned foods, and increased their production so much as to inevitably shoot can manufacture up into volume. About 5,000,000 cans were made at the beginning of the war. By 1870, the output had increased six fold.

And it was at this stage that several inventions of importance in canned foods processing acted to increase the volume of tin cans, even to a greater degree than did refinements in the art of can making itself, which were indeed negligible. Canners were still processing (cooking) by boiling the cans for long periods. A Baltimore canner named Isaac Solomon applied an English discovery to the process. He added calcium chloride to the boiling water. Its temperature was increased to 240 degrees plus. Overnight, the time necessary for sterilization was reduced from five or six hours down to half an hour. The canner whose kettle capacity would produce 1,000 cans was able to turn out 10,000. This occurred on the threshold of the Civil War, in 1861.

That great disturbance gave many people their first taste of canned foods. Soldiers ate them in their bivouacs; sailors on their gunboats; the wounded in hospitals. Canning was no longer confined to the seaboard—to centers around Baltimore and in New England. Canneries sprang up inland—at Cincinnati and Indianapolis. Borden found a market for his canned condensed milk, after having failed for 10 years to put it over.

Improvements and inventions in the field of canning machinery also played their part in this expansion. It wasn't due alone to processing refinements and the sole outstanding can-making improvement of the time, namely, the invention of capping seals and a furnace with which a young boy could seal twice as many cans as could the master tinsmith with the old style of soldering iron. This inventor was another Maryland canner, Louis McMurray. He also was the first big corn canner, and a new product leaped into the market, one that was destined to become one of the "big three" packs of canning. Last year, corn canners alone used about 264,000,000 cans.

Peas had to be shelled and picked by hand. E. P. Scott and C. P. and J. A. Chisholm perfected a machine that would shell peas from the pod as fast as 1,000 hand workers. Then Scott went a step further and produced the pea viner which, by using a paddle principle, knocked the peas out of pods and sifted them. Nearly 600,000,000 cans were needed last year to hold all the peas packed in America.

Someone discovered and broadcast the fact that tomatoes, or Love Apples as they were called then, were *not* poisonous. Nearly 648,000,000 cans of tomatoes were put up last year, with another 192,000,000 odd cans of tomato juice on top of that.

A machine was perfected that automatically peeled and cored pineapples. Again, volume production of tin cans soared. Improvements in

[*Continued on page* 166]

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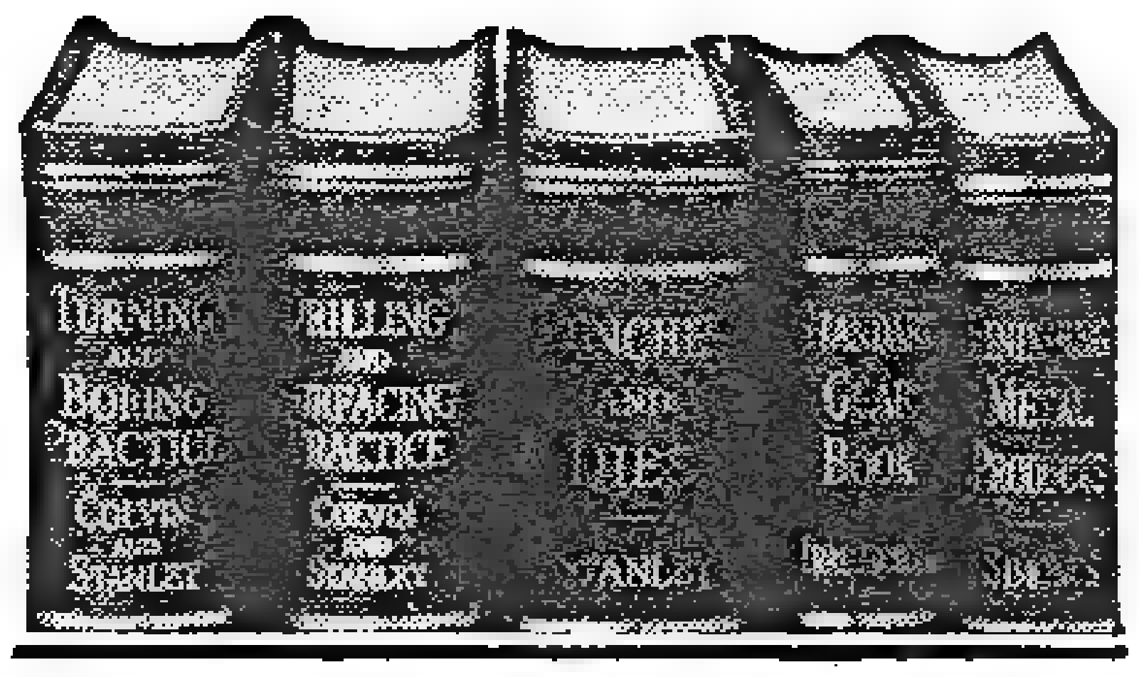

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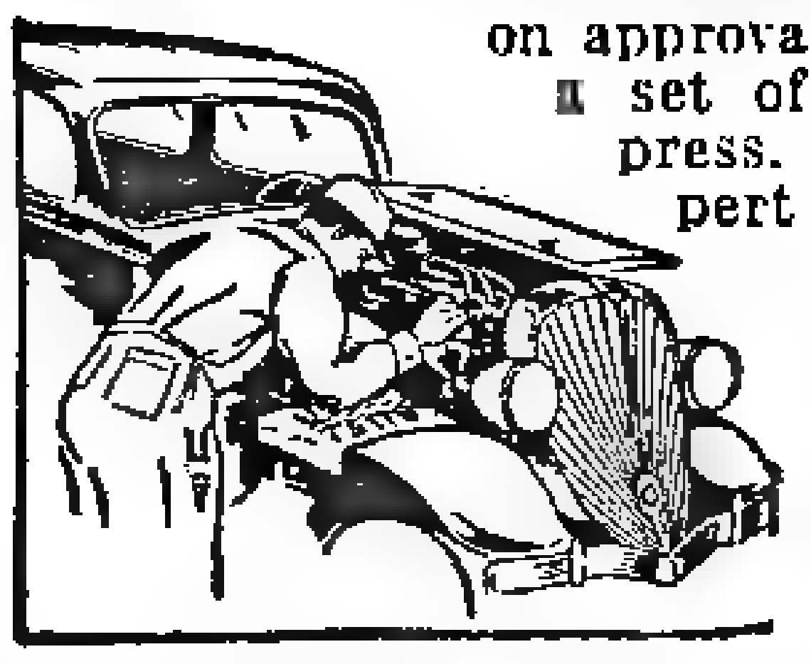

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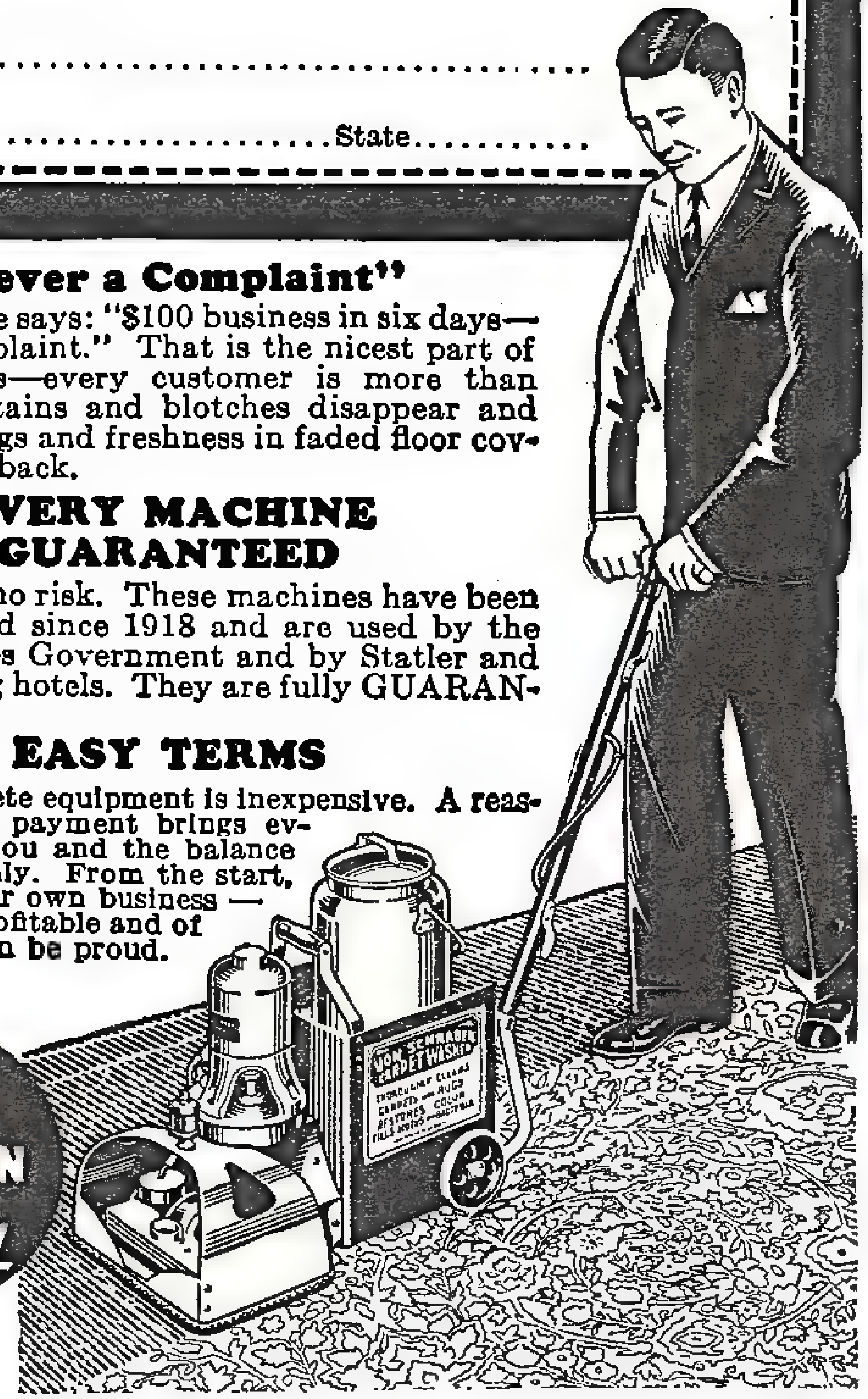

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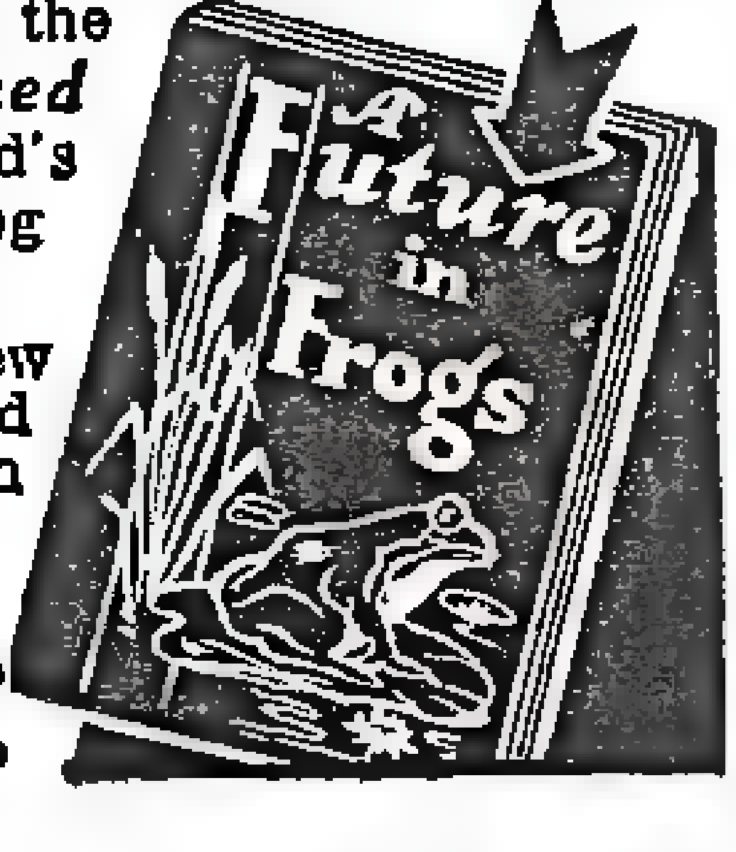

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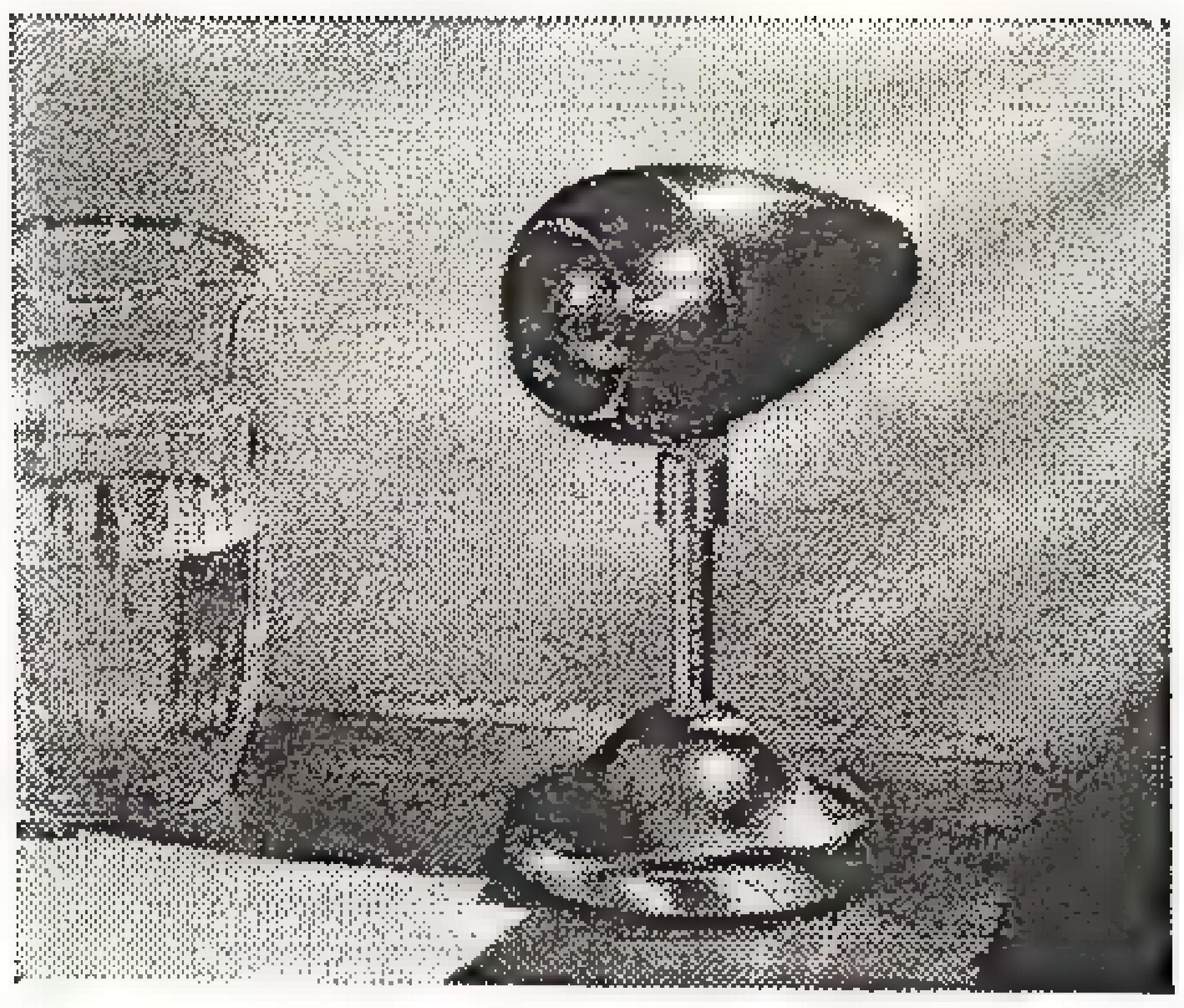

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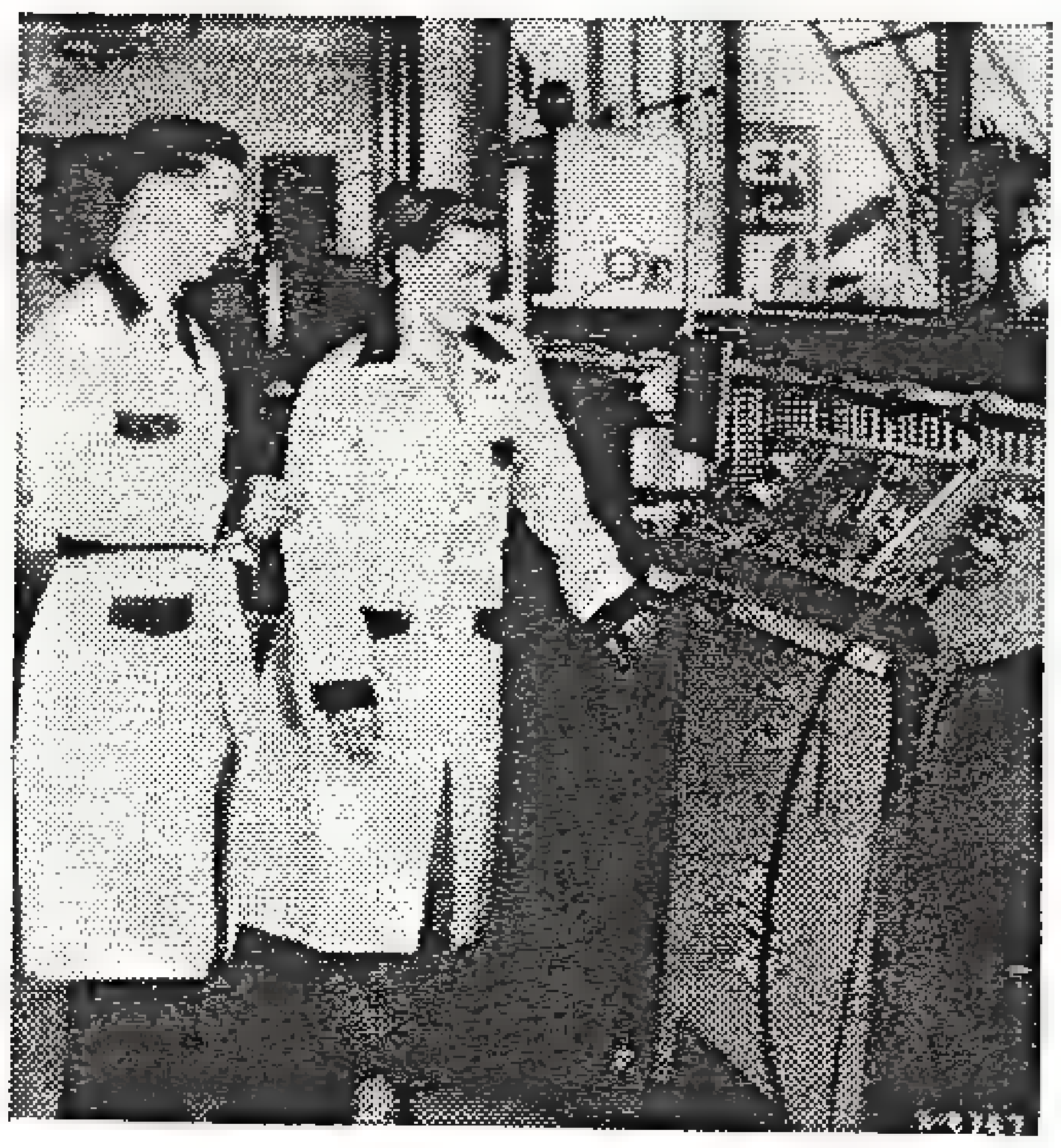

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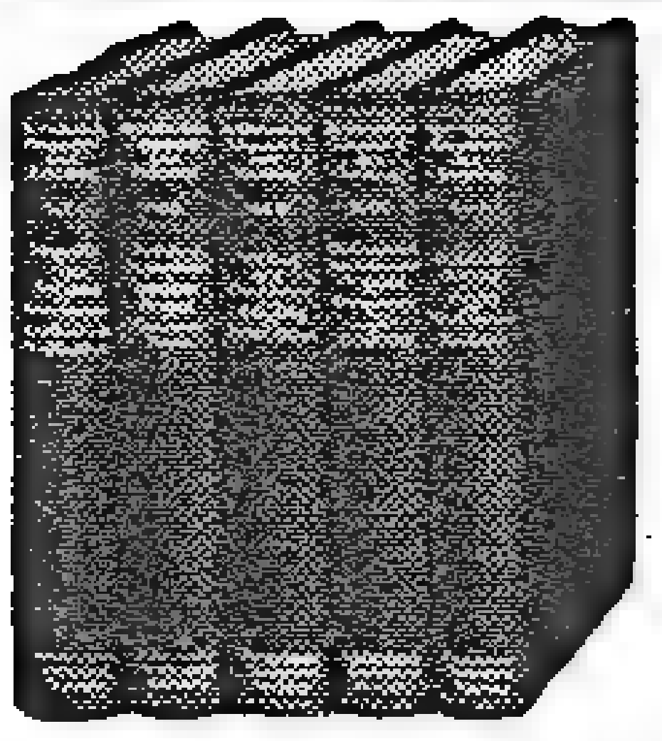

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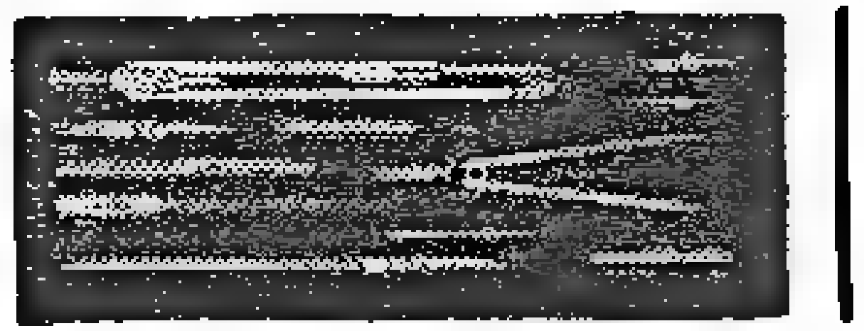

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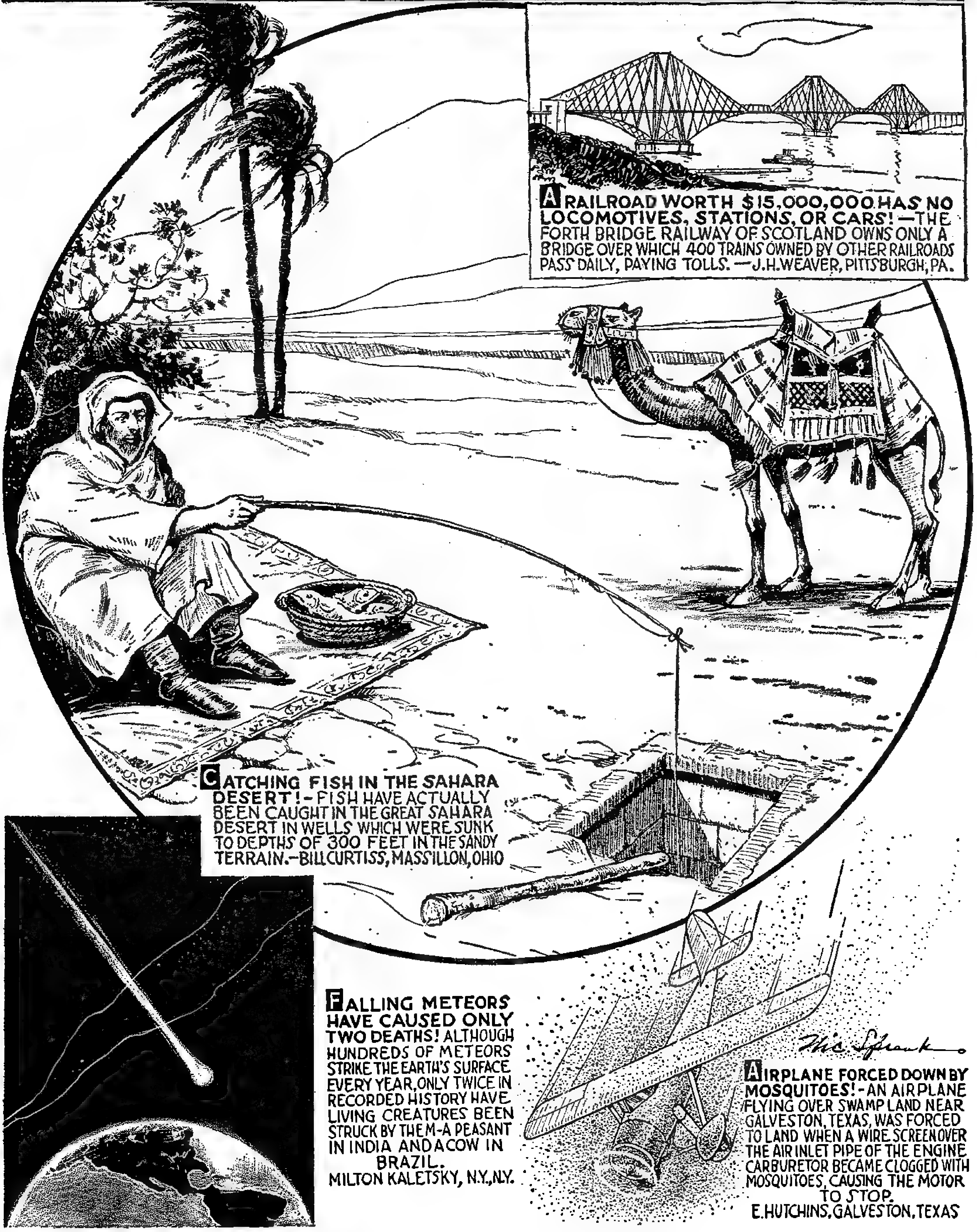

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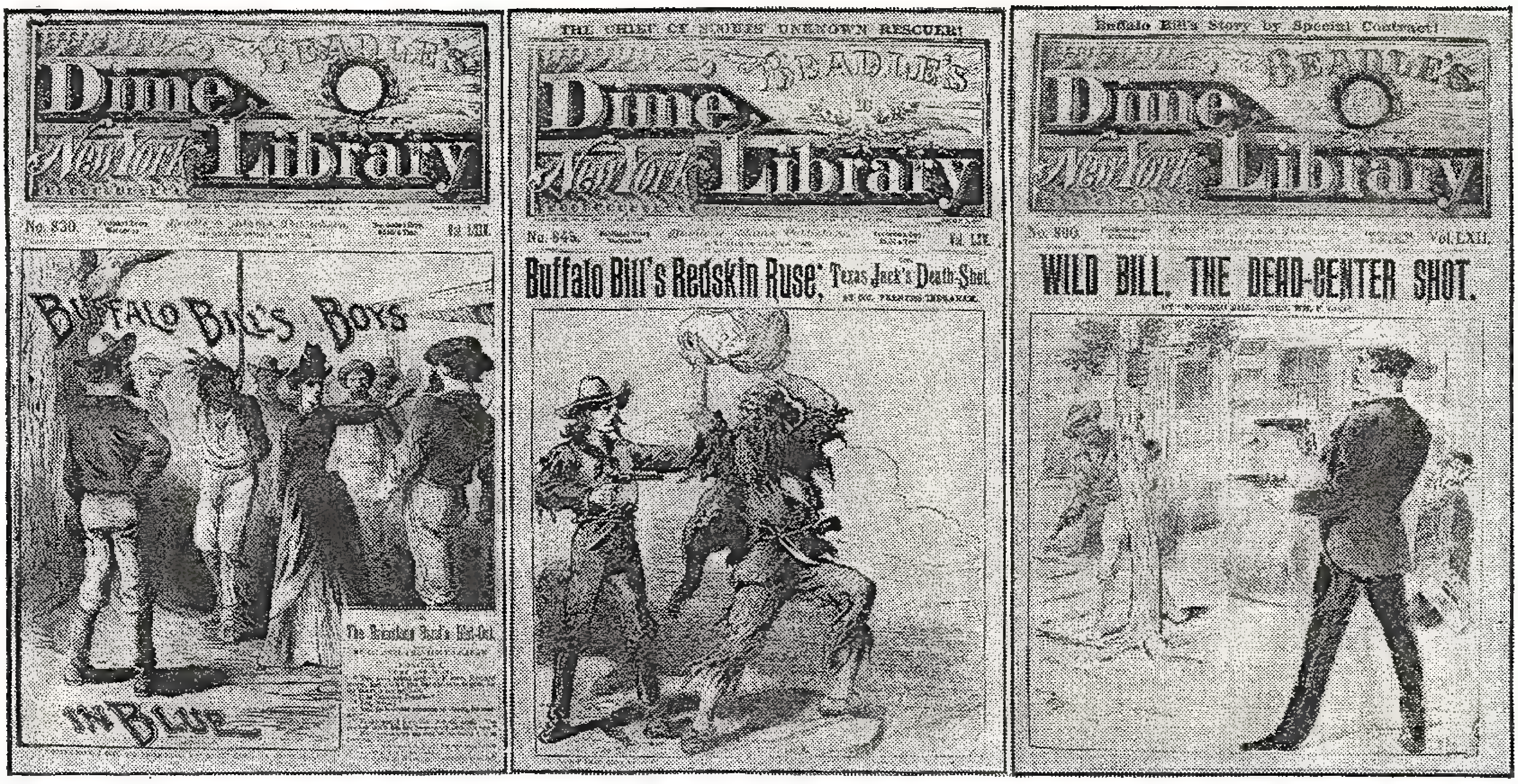
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Romance Of The Tin Can

[*Continued from page* 155]

salmon, in peaches, pears, apples, all had the effect of adding immediately to can production. The cooking time was shortened again when another Maryland canner—A. K. Shriver—developed the closed kettle. Cooking could be done so speedily that all this automatic machinery had be to perfected so that preparation of food could keep up with canning. Canning technology was improved; the technique of making the can was improved; machinery for both operations was improved.

Better cans now were being made. Dies worked by foot power were introduced. A hole was cut in the top large enough to insert food into the can after the top had been soldered on, with a round disc to be soldered over the aperture, following processing. This was known as the "hole-in-top" can.

The next style was the "open-top." Tops and bottoms were crimped on without using solder. Thick rubber gaskets made the can air-tight and the crimping of top and bottom was accomplished by folding them over these gaskets.

And then came the most forward step of all—development and perfection of the "sanitary can" —a refinement of the "open-top"—and the can you see all about you today. This generation of consumers never saw anything else.

This can was brought forth in 1896. Charles M. Ams, a chemist, evolved a liquid compound to take the place of the awkward rubber gasket.

George W. Cobb, in Fairport, N. Y., was having trouble getting peaches, pears, and other solid fruit particles filled into the old "hole-in-top" can without mutilating them. He became interested in the Ams can, which, being open at the top, would solve that problem for him. His company, the Cobb Preserving Company, had been manufacturing its own cans since it was founded in 1875. This youthful manager of production installed the Ams apparatus in his plant.

In 1902 and again in 1903 his results were convincing enough to warrant the formation of a company the following year devoted to the manufacture and distribution of sanitary cans. Can making was started in a building at Fairport in July, 1904. Eight million cans were made the first year. In three years a branch plant went up in New Jersey and another in Indianapolis; later a plant at Niagara Falls, Ont. These were purchased in 1908 by the American Can Company.

The sanitary can was unquestionably the chief factor in bringing tin can production to its present figure of astounding magnitude, and it was the last achievement of revolutionary aspect in the history of the tin can.

Lacquers, enamels and lithography have come along to adorn and beautify cans but their chief value has always been and always will be their practicability, utility and convenience. The perfect vessel for food—they cook and they carry, achieving Appert's dream—to keep foods edible over long periods of time.

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39hrs 42

BOB McKENZIE
TRANSCONTINENTAL AUTOMOBILE CHAMPION
COAST TO COAST

WESTERN UNION
TIMED

NEW YORK
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LOS ANGELES
54 HRS.-40 MIN.

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CANADA
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15 DAYS

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TO
NEW YORK
AND RETURN
121 HRS.-52 MIN.

WASHINGTON, D.C.
TO
MEXICO CITY
62 HRS.-27 MIN.

LOS ANGELES
TO
PHOENIX
6 HRS.-15 MIN.

MUROC DRYLAKE
1567 MI. IN 1 DAY

LOS ANGELES
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HRS.-21 MIN.

Vacu-matic Carburetor Co.
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The distance covered was 2322 miles in thirty nine hours and forty-two minutes, officially timed by Western Union, which gave me an average speed of 59.7 M.P.H. based on elapsed time and with the Vacu-matic averaged 18 1/2 miles per gallon on gasoline.

Before leaving Los Angeles, we made several test runs both with and without the Vacu-matic, and the tests proved that Vacu-matic increased my gas mileage 3 1/2 miles per gallon at the driving speed of 60 M.P.H. and also very noticeable increase in both acceleration and power.

After this experience with Vacu-matic, you can depend that on my future speed runs across country that I will be depending on Vacu-matic to give me the same added performance it has proven on this last record breaking drive.

Yours very truly,
Bob McKenzie

Sets New Coast-to-Chicago Record

New Supercharge Principle SAVES GAS

MORE POWER - MORE SPEED
FASTER PICK-UP - - NEW LIFE

ESTABLISHING new mileage records on cars in all sections of the country, the Vacu-matic again scores in a new speed record established by Bob McKenzie transcontinental automobile champion. Los Angeles to Chicago—2,322 miles in 39 hours and 42 minutes— driving 75 and 80 to maintain a speed average of 59.7 miles per hour!

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Automatic • • Nothing Like It!

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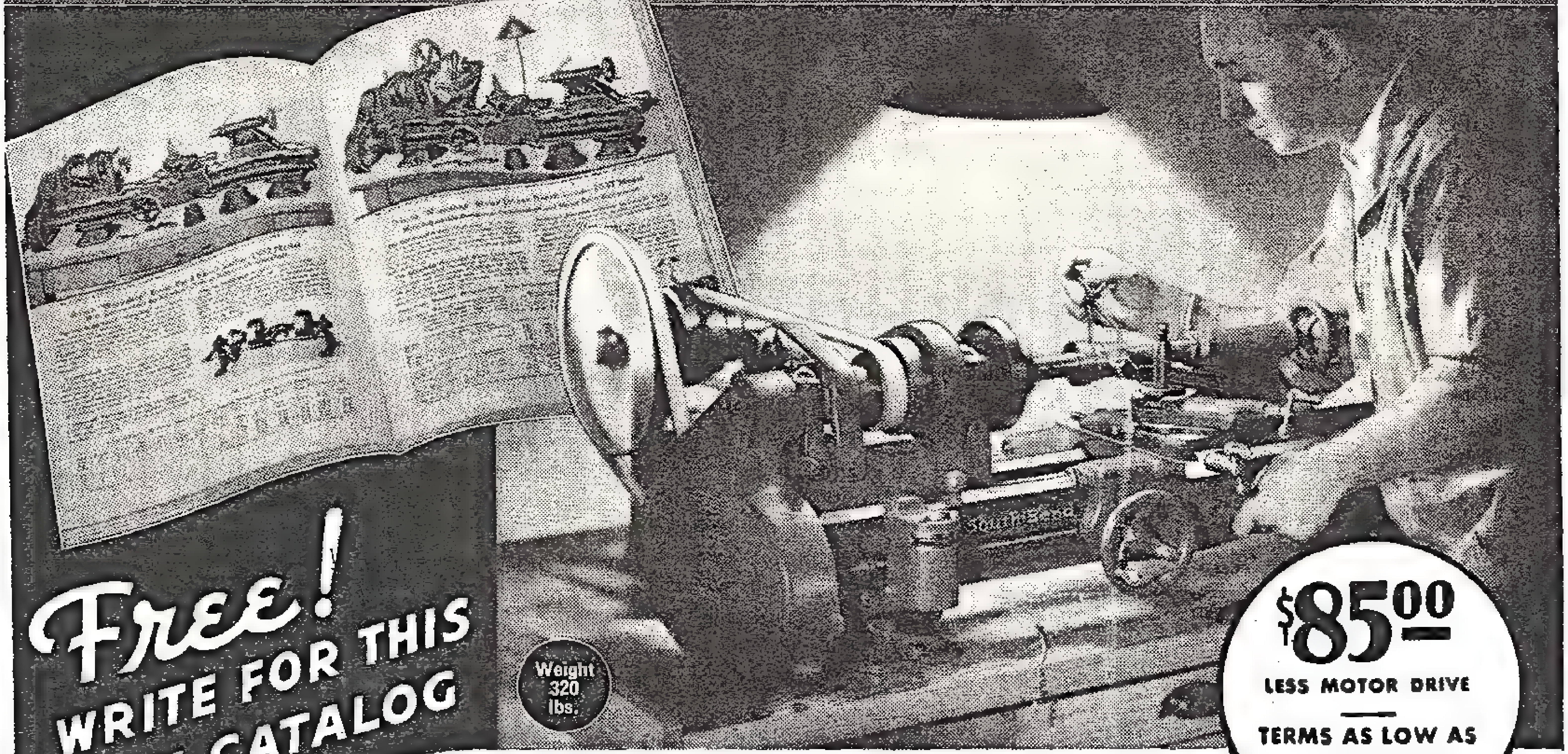

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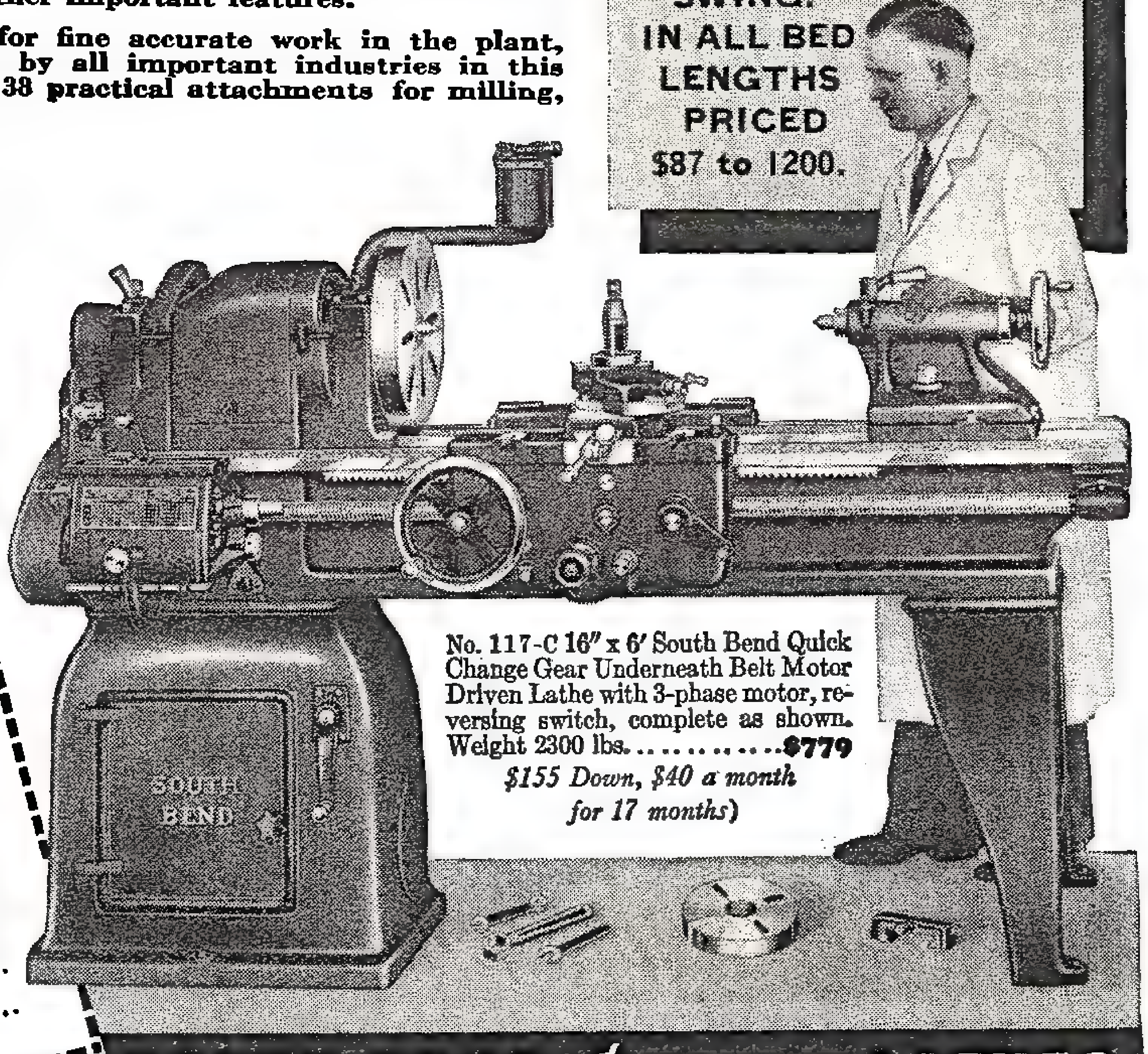

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SOUTH BEND *Precision* LATHES

"Airflow" Sled Gives Thrills

[*Continued from page* 132]

have to rewire the various units as well as devise a new hitch for the starter button. This latter may be either on the dash or on the floor.

As things stand now we have the complete chassis with runners and steering gear installed but as yet without provision for propelling it over the bounding ice. This feat is accomplished by means of an airplane propeller mounted above and behind the motor.

A ready made prop is thoroughly recommended. Unless you are versed in such matters your attempts to manufacture a satisfactory propeller are not likely to be linked with much success. Fortunately it is possible to buy commercial propellers made expressly for ice sleds and graded to suit different types of car engines at what constitutes really a modest sum.

The drive hookup is shown in the detailed drawings. Ingenious builders will probably devise their own drive details. In any case the transmission from engine shaft to prop shaft is greatly dependent upon the possibilities offered by the engine itself. Generally speaking it is best to take the drive from the fan belt driveshaft wherever this shaft permits the use of a larger diameter pulley. Twin pulleys of about 5" diameter on each shaft are recommended. As to the drive ratio, no reduction will be required using a light car engine and a 5-foot commercial propeller. If, however, you have been able to pick up a larger prop at bargain prices there is no reason why you should not use it. In this case some reduction in the drive will be necessary.

The shaft hanger for the prop is made from a front wheel hub. Cut *all* the spokes off and mount the hub on iron or steel pipe struts. The struts are bolted direct to the chassis and their exact length is determined by the width of the chassis and the diameter of the prop used. Thrust struts are added as shown and may be of pipe or of angle iron.

The side frame members of the body may be of wood or of angle iron. Your own skill in handling materials and the condition of your pocketbook are the determining factors here. The sides and front are covered with pressed wood and metal sheet respectively. The roof may be either a flat surface of pressed wood as indicated in the drawings or a built-up structure covered with fabrikoid may be used. Windows of heavy celluloid are preferable to glass.

And there we are! The late occupant of the junkyard is now completely transformed into an "Airflow" ice vehicle you will be proud to own. And if you have been careful in selecting and conditioning the motor, all that remains is to invite your friends; climb aboard; step on the starter, shove the control column forward to release the brake and speed off in that exhilarating gliding motion which is probably the nearest thing to flying that exists.

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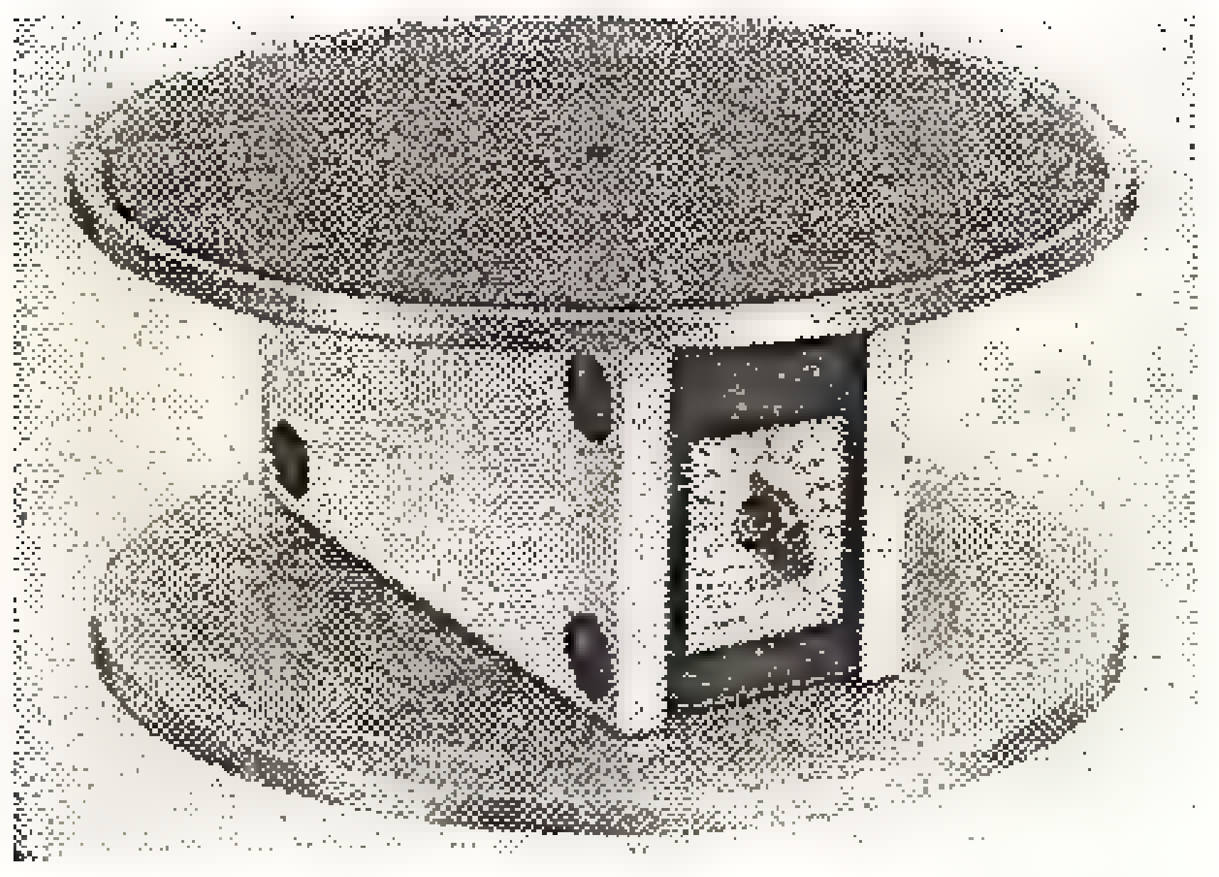

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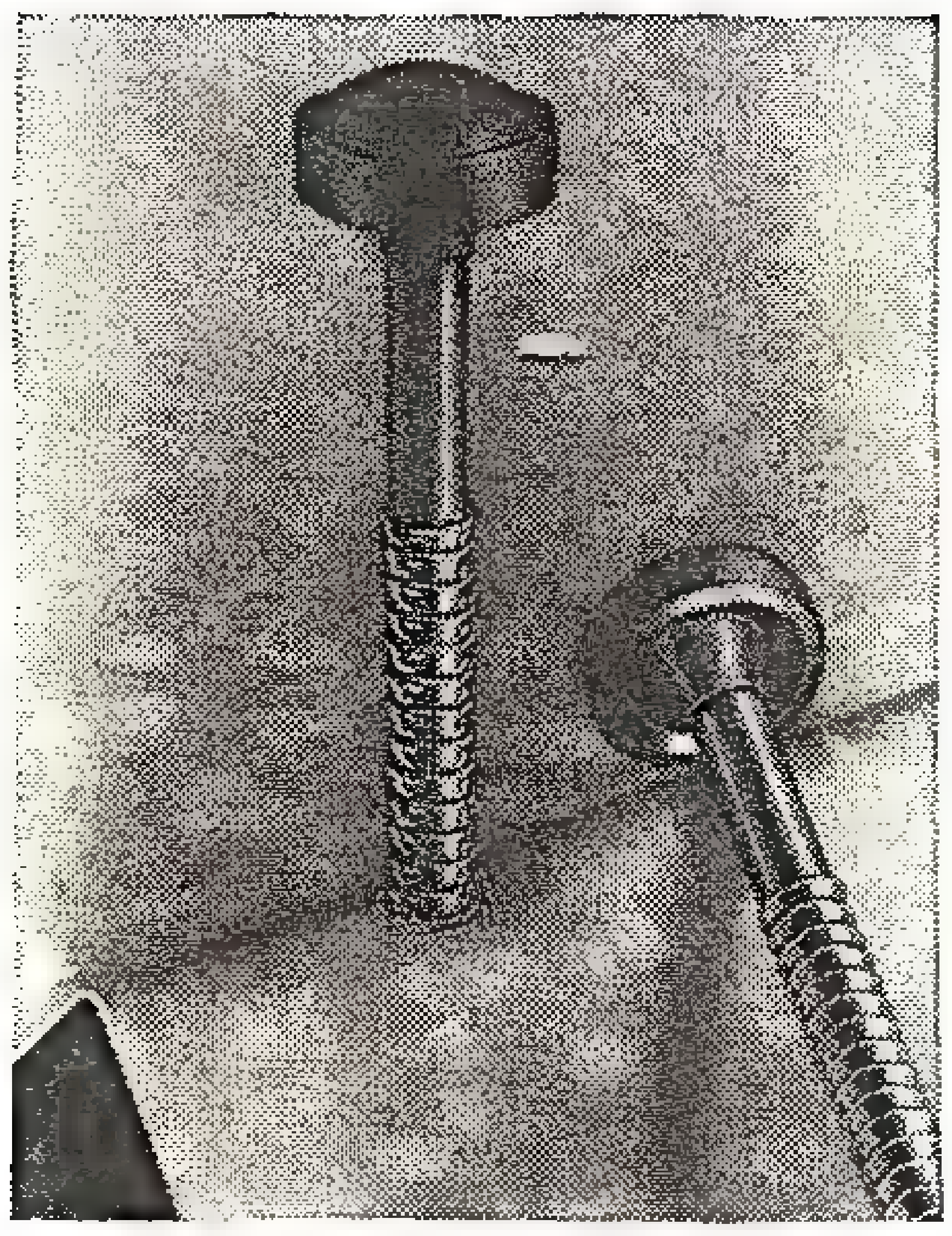

To gain holding power, these lead headed nails employ the principle of the anchor, the anchors being arranged in rings about the shank.

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Polish for cleaning reflectors of auto headlights, flashlights, etc.

A belt and leathercrafter's punch that is equipped with drive tubes offering a choice of four to six hole sizes.

Restauranteurs will like this metal "oystray." It has six molds for oysters, a center pit for cocktail sauce, and an ice tray in bottom.

An air cooled bicycle coaster brake that has six additional inches of cooling surface due to hub design. Requires less lubrication.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped, self-addressed envelope to Modern Mechanix Publishing Co., Information Bureau, Fawcett Building, Greenwich, Connecticut. Manufacturers are invited to submit material for publication on this page.

She Got $400.00 for a Half Dollar

I will pay CASH for OLD COINS, BILLS and STAMPS

Mrs. S. Dowty, of Texas, sold B. Max Mehl one half dollar for $400.00.

I WILL PAY UP TO $6,500.00 For One Old Coin

I PAID $200.00 to J. D. MARTIN, OF VIRGINIA FOR JUST ONE COPPER CENT

"Please accept my thanks for your check for $200.00 in payment for the copper cent I sent you. I appreciate the interest you have given this transaction. It's a pleasure to do business with a firm that handles matters as you do. I wish to assure you it will be a pleasure to me to tell all my friends of your wonderful offer for old coins."
Julian D. Martin, Va.

This is but one of the many similar letters I am constantly receiving. Post yourself! It pays! I paid Mr. Manning, New York, $2,500.00 for a single silver dollar. Mrs. G. F. Adams, Ohio, received $740.00 for some old coins. I paid W. F. Wilharm, of Pennsylvania, $13,500.00 for his rare coins. I paid J. T. Neville, of North Dakota, $200.00 for a $10 bill he picked up in circulation. I paid $1,000.00 to Mr. J. E. Brownlee, of Ga., for one old coin. Mr. Brownlee says: *"Your letter received with the check for $1,000.00 enclosed. I like to deal with such men as you and hope you continue buying coins for a long time."* In the last 36 years I have paid hundreds of others handsome premiums for old bills and coins.

All Kinds of Old Coins, Medals, Bills and Stamps Wanted

$1.00 to $1,000 paid for certain old cents, nickels, dimes, quarters, etc. Right now I will pay $50.00 for 1913 Liberty Head nickels (not buffalo), $100.00 for 1894 dimes ("S" Mint), $8.00 for 1853 quarters (no arrows), $10.00 for 1866 quarters (no motto), $200.00 each for 1884 and 1885 Silver Trade Dollars, etc., etc.

I Have Been Buying Old Money For 36 Years

Any bank in Fort Worth or Dun & Bradstreets will testify as to my responsibility. My volume of business, built on fair and prompt dealings for 36 years, is such that I own and occupy my own building devoted to my coin business. You will find every respresentation I make to be true and not exaggerated. It will pay you to do business with me.

Amazing Profits

FOR THOSE WHO KNOW OLD MONEY!

There are single pennies that sell for $100.00. There are nickels worth many dollars—dimes, quarters, half dollars and dollars on which big cash premiums are paid. Each year a fortune is offered by collectors for rare coins and stamps for their collections. The prices paid are amazing.

It Pays to Post Yourself on the Big Values of Old Coins and Stamps

Knowing about coins pays. Andrew Henry, of Idaho, was paid $900.00 for a half dollar, received in change. A valuable old coin may come into your possession or you may have one now and not know it. Post yourself.

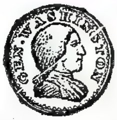
Huge Premiums for Old Stamps

Some old stamps bring big premiums. An old 10c stamp, found in an old basket, was recently sold for $10,000.00. There may be valuable stamps on some of your old letters. It will pay you to know how to recognize them.

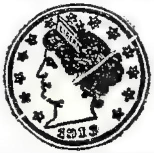
Let Me Send You My Big Illustrated Coin Folder! It Will Open Your Eyes! Use the Coupon Below!

Send the coupon below and 4 cents for my Large Illustrated Coin and Stamp Folder and further particulars. *Write today* for this eye-opening valuable wealth of information on the profits that have been made from old money. No obligation on your part. You have nothing to lose—everything to gain. It may mean much profit to you.

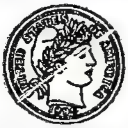
Largest Rare Coin Co. in the U. S.
Established 36 Years.
(Copyright 1937)



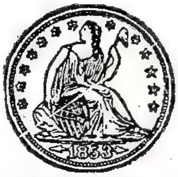
I paid Julian D. Martin $200 for one old Copper Cent of the year 1793.



James House of Mobile, Ala., received $50 from me for a 1913 Liberty Head Nickel (not Buffalo).



I will pay $100.00 for an 1894 "S" Mint Dime in good condition.



I paid Mrs. Dowty, of Texas, $400.00 for just one Half Dollar.

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FORT WORTH, TEXAS

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ADDRESS ....

CITY ....STATE ....

B. MAX MEHL *Director Numismatic Co. of Texas*
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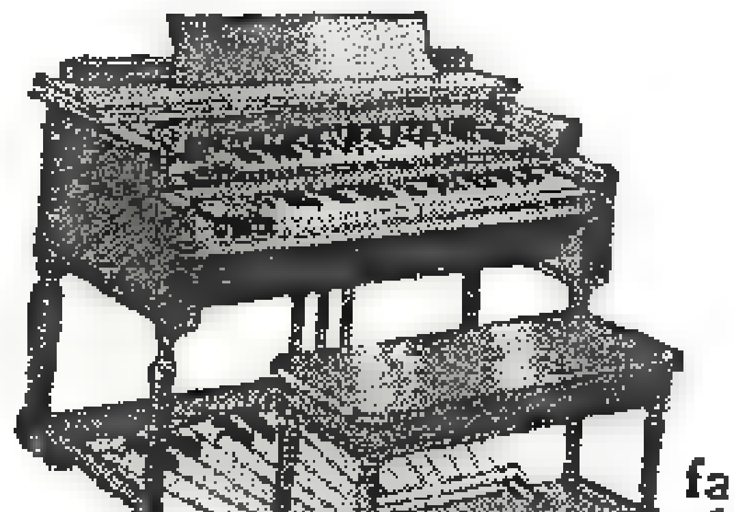
Double Page Spreads

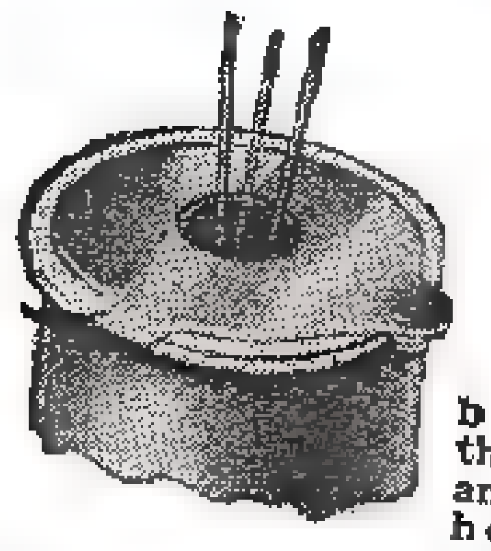
INVENTORS' CALENDAR

FOR THE YEAR OF 1936

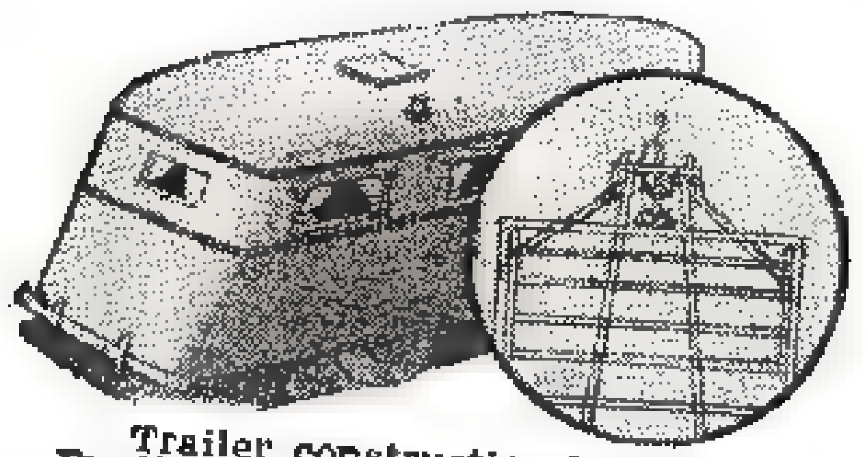
What will the inventions of 1937 be?



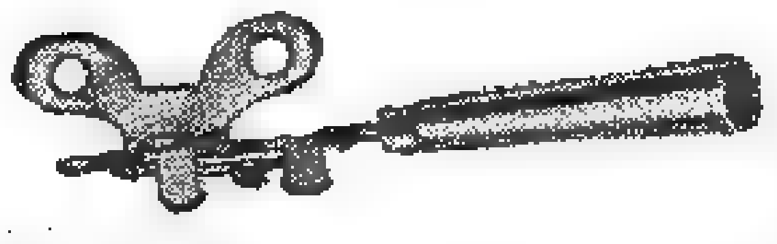
Here's the famous new electric organ, patented by John Hays Hammond, Jr. Contains no pipes. Creates musical tones electrically. Connects to ordinary light socket. Smaller and lighter than an upright piano. Said to produce more than two hundred and fifty million different musical effects.



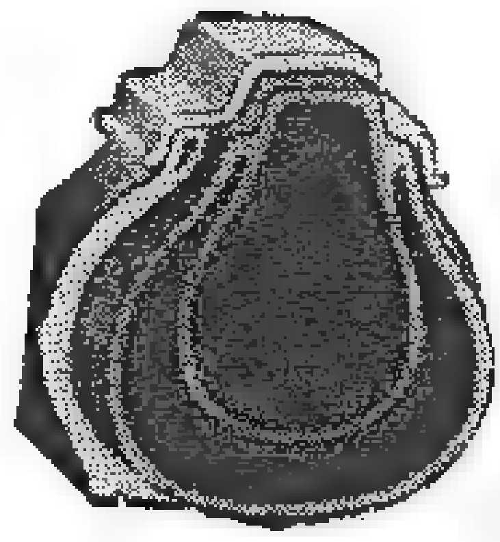
This combination thread-cutter and needle-holder, recently patented, may prove a boon to busy housewives, and it clearly shows what a field there is for handy household inventions. With this device, the needles are always right where you want them, and the thread is easily cut off without tangling or ravelling.



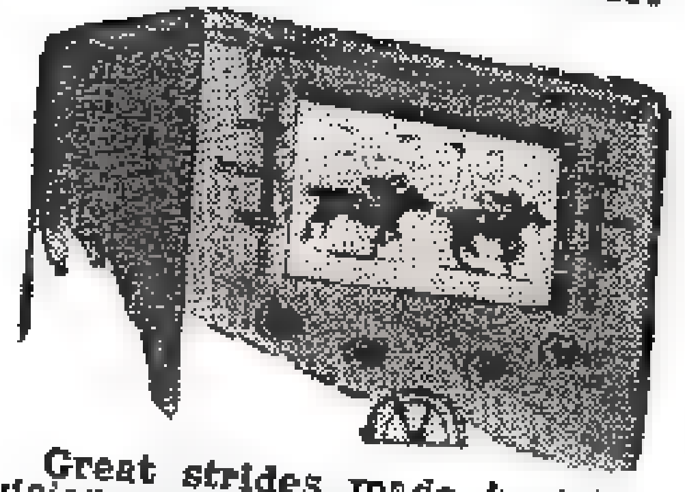
Trailer construction has boomed. Predictions are that soon millions will be living and traveling in trailers. Inset shows a special type of trailer brake mechanism (Manufactured by Wood-Owen Trailer Co.). When driver of automobile applies brakes, brakes are automatically applied to trailer.



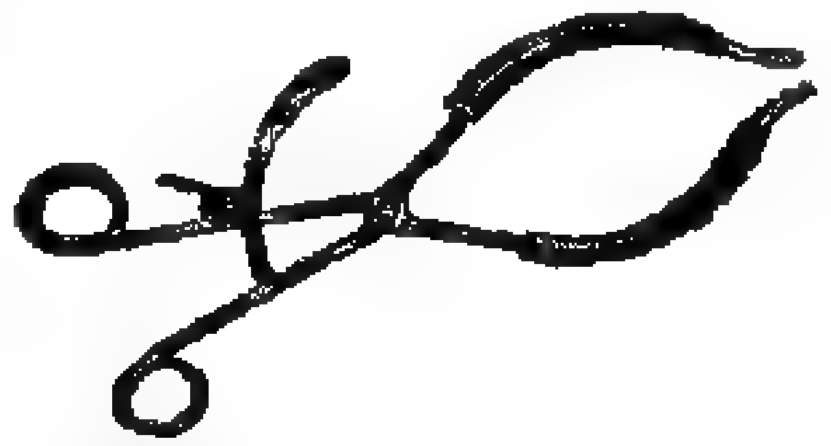
Numerous inventions relating to the home, simple gadgets for everyday use, are constantly being improved. Even such a commonplace article as the can opener affords room for improvement in construction. Shown is one patented this past year by Melvin Higgs, Pomona, California.



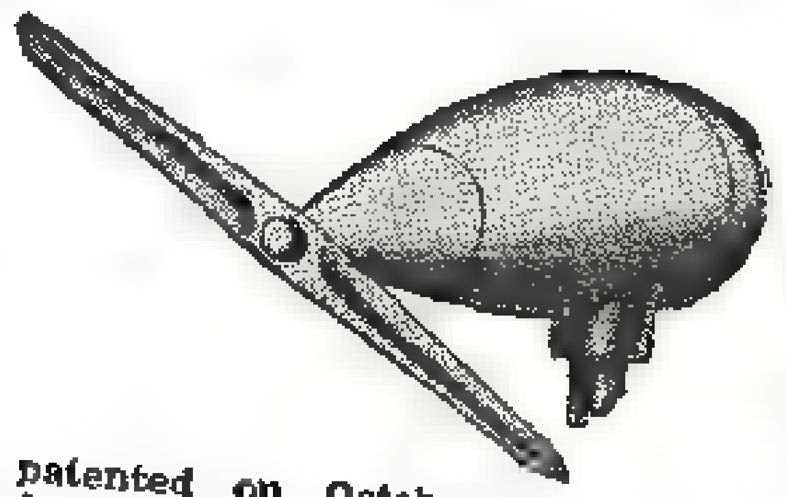
Many advances have been made in tire construction. Shown is a new Life Guard Tube introduced by Goodyear. Has a secondary tube within the main tube. Many other developments in tire construction have taken place.



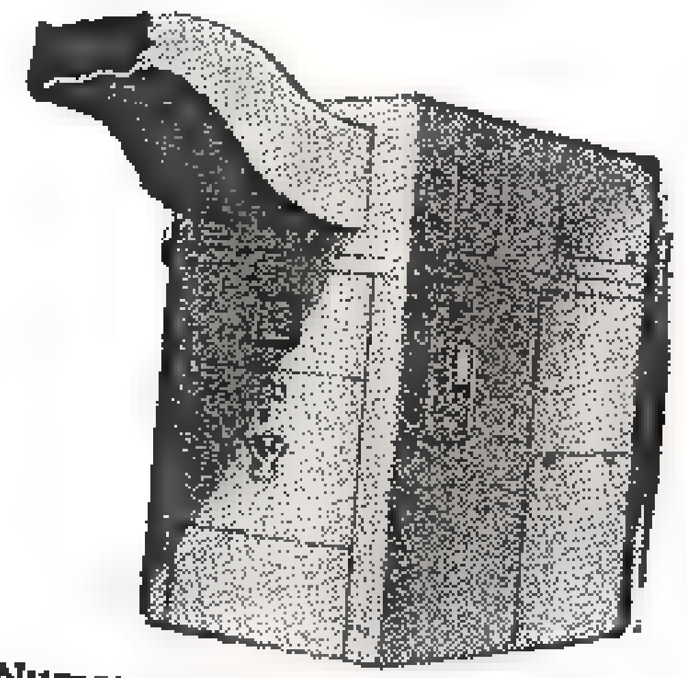
Great strides made in television, with several practical sets for home reception demonstrated in New York and elsewhere.



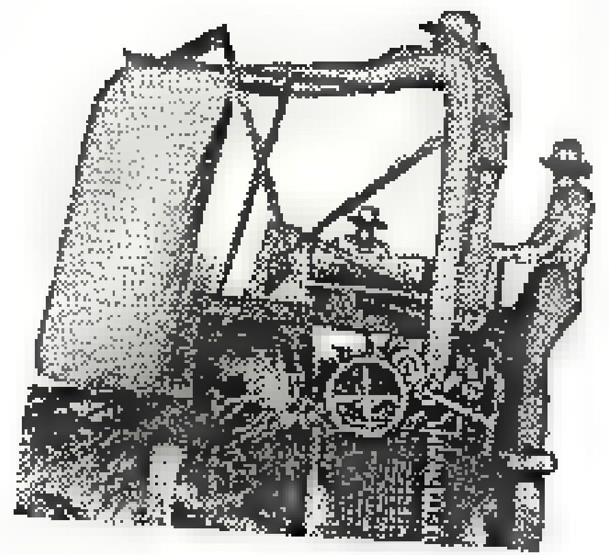
Advancement has been made in the field of first aid and medical equipment. Here is a simple operating tourniquet which can be instantly applied to stop the flow of blood from an injured member of the body. Permits application of pressure and may be released instantly or gradually.



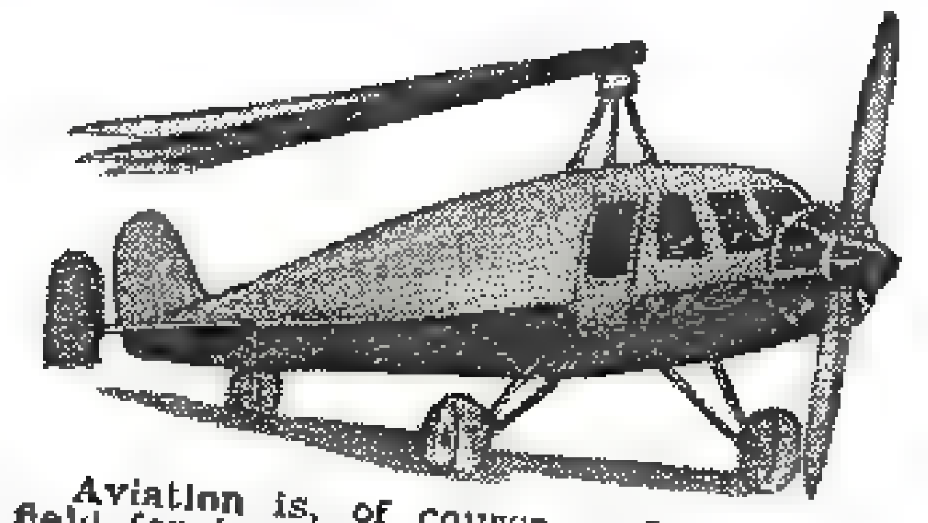
Electricity for the farm: Here is a novel wind-generator, patented on October 27, 1936, which may have the effect of bringing cheap electric power to thousands of isolated farms and homes. It heads into the wind automatically and has an automatic governor.



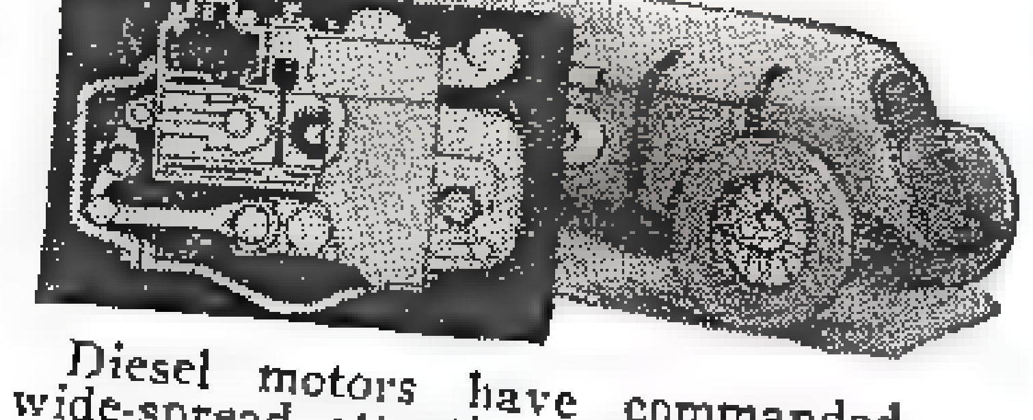
Numerous patents have been taken out in Air Conditioning. It is predicted that homes, office and factory buildings and all forms of travel conveyances will be air conditioned.



A startling inventive development brought to light this year is the famous Rust Cotton Picker said to do the work of seventy-five to one hundred men at one-sixth the cost. Will this prove as revolutionary in the cotton industry as Eli Whitney's famous cotton gin? Some say it will.



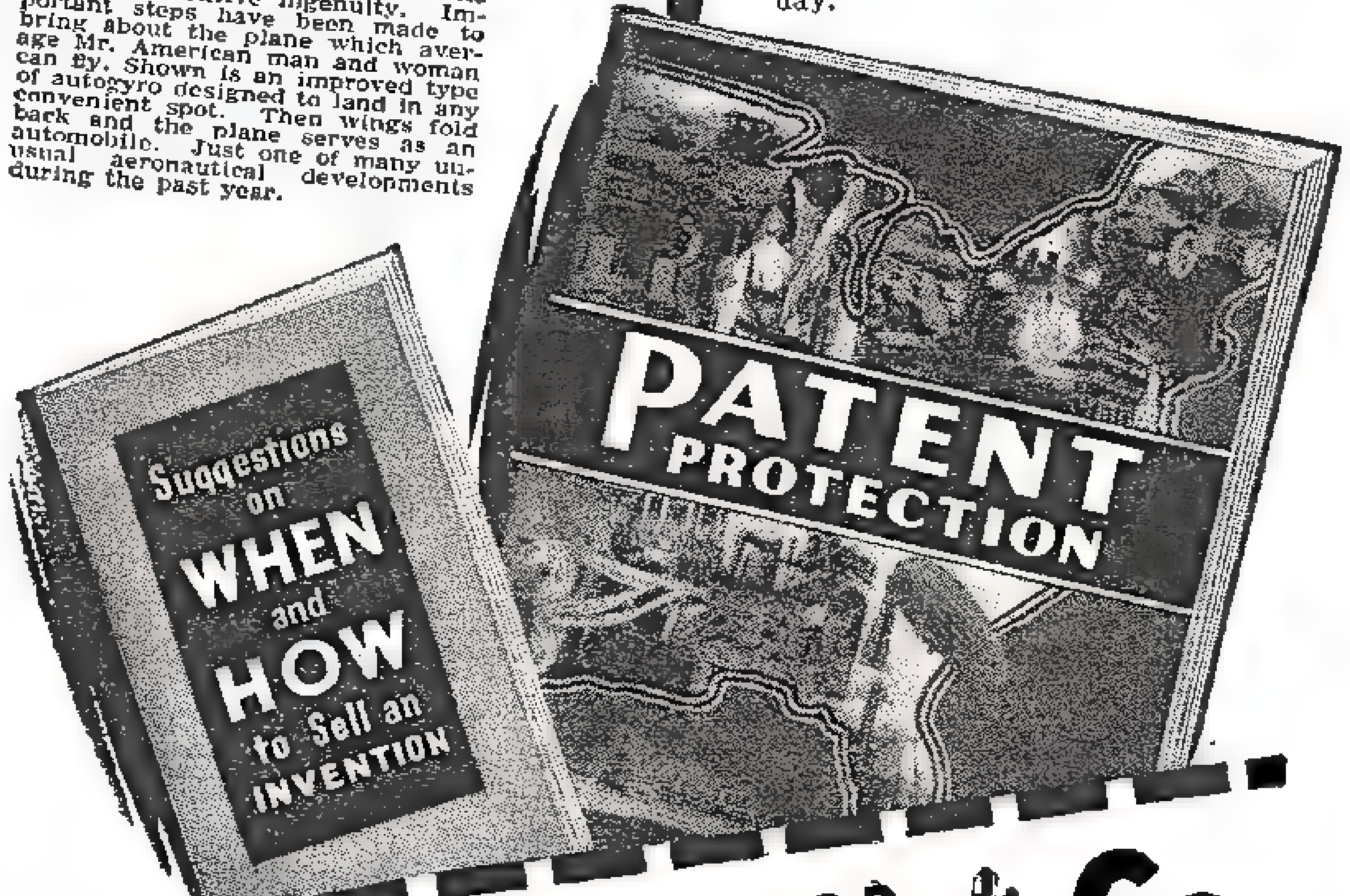
Aviation is, of course, a fertile field for inventive ingenuity. Important steps have been made to bring about the plane which average Mr. American man and woman can fly. Shown is an improved type of autogyro designed to land in any convenient spot. Then wings fold back and the plane serves as an automobile. Just one of many unusual aeronautical developments during the past year.



Diesel motors have commanded wide-spread attention. Shown is a racing car powered by Diesel. The car did 137.195 miles per hour. Inset shows a new Hill Diesel engine exhibited last year at New York Motor Boat Show. Its designer was R. E. Olds, pioneer in automobile industry.

READ THESE FREE BOOKS

We helped hundreds of inventors during 1936—perhaps we can help **you** now. If you have a useful invention, if you have a good idea in mind you should read these two free books—64 pages of FACTS for inventors. They answer your questions: What can be patented? How does the law protect me? What is my first step? How much will it cost? When can I wisely take steps to sell my invention? They answer these and many more. Receive these facts. Mail the coupon today.


Suggestions on WHEN and HOW to Sell an INVENTION
PATENT PROTECTION

FROM 1898 TO 1937

THESE INVENTIONS HELPED MAKE THE HISTORY OF 1936—1937 WILL WELCOME AND REWARD THE SAME SPIRIT OF PROGRESS

Television and trailers—simple household devices—all helped make inventive history during 1936. Invention marches on in every field, in every sphere of human life. Hard times are leaving, prosperity returning. Men are going back to work. Times are changing—getting better. We believe that 1937 will be a good year for worthwhile inventions.

Look Around—Look Ahead

At the recent Centennial Celebration of the American Patent System an old letter of Andrew Carnegie's was reproduced, in which he spoke of his 1905 Winton Automobile. Mr. Carnegie said: "There may be improvements yet to come, but it is difficult to see room for them". Think of it! Difficult to see any room for improvement on a 1905 "chuggamobile". The truth is the 1937 automobile contains **more than 100,000 patented improvements.** There is always room for improvement. Men who look around, then **look ahead** can help the world and help themselves by developing worthwhile inventions.

Your Idea May Be A Good One

If you have been looking around—looking ahead—you may have a worthwhile idea. It may be for the house, the farm, the shop; for some new method or some new composition. And if it is worthwhile—if it is practical and new—it may be worth patenting.

Our Service to Inventors

Since 1898 we have helped inventors protect their rights. The law is designed to protect you, provided you take certain definite steps—and we tell you what these steps are, show you how to take them, render prompt, efficient service. If you have a worthwhile invention, or an idea for one, the facts in the booklets shown on the opposite page will be interesting to you. With them we also send you our Evidence of Invention form which will assist you in making a proper disclosure of your invention. These booklets were prepared to answer the questions which from long experience we know the average inventor has in mind. They tell you what to do, when and how to do it. We have endeavored to make them both informative and interesting. They explain the purpose of the patent laws, how they protect an inventor, what factors to consider when selling an invention, how to take steps to secure financial assistance, and much more. There are many illustrations, numerous interesting sidelights on inventive history. We believe that you will welcome this literature. There is no charge or obligation. Simply mail the coupon on this page or if you prefer, write us with the understanding that all correspondence is absolutely confidential.

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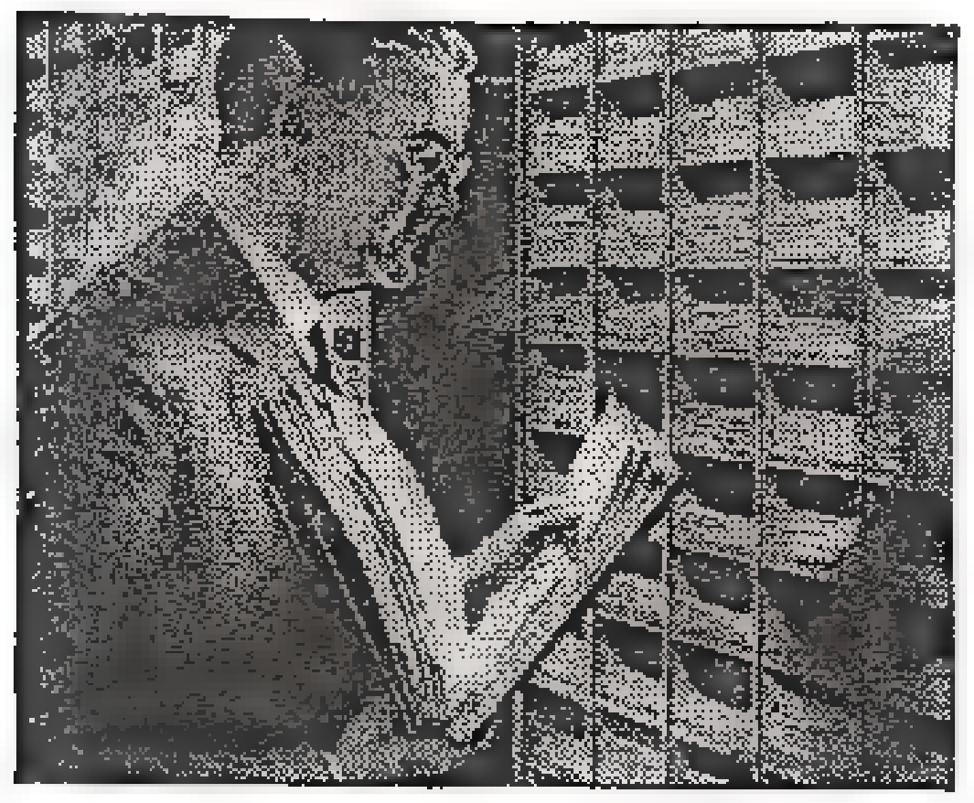
INVENTORS

STEP NO. ONE
Make a rough pencil sketch of your invention, describe it fully, and send it to us for preliminary search through United States Patents in the U. S. Patent Office.



STEP NO. TWO
Our trained searchers will then make a preliminary search of the pertinent U. S. patents to determine if your invention is probably patentable.

STEP NO. THREE
Our complete report of search and opinion on patentability will be mailed to you with copies of U. S. Patents that we consider nearest to your invention.

STEP NO. FOUR
If you decide to make patent application, for customary fees explained in our booklet, our draftsmen will make drawings and proper papers will be prepared for presentation of your invention to the Patent Examiner in U. S. Patent office.

KNOW HOW TO START
KNOW EACH STEP TO TAKE

Before Going too Far with Your Inventions

Very often, the patent procedure is what we call a "simple" one—as illustrated here. Our FREE BOOK, "Patent Guide for the Inventor," describes what to do and how to go about it. Send for it by all means—let us urge, however, that you take the first step (Step No. 1 to left) without further delay. It will prevent wasted work, mis-steps, and going ahead "in the dark"—your whole patent procedure depends upon the first step.

If you have an invention that is patentable—and want to secure for yourself your inventor's sole right to profit from the invention—you can't afford to lose time in securing the protection of a U. S. Patent. Other inventors may be working on the same thing right now. Should they develop this invention and file patent application before you do—the burden of establishing priority will be upon you. Our Big Book—"Patent Guide for the Inventor"—will tell you the quickest possible way to secure Patent Protection for your invention. SEND FOR IT TODAY!

Immediate Search Necessary

A Search at the U. S. Patent Office will disclose one of three things: That you have hit upon an entirely original invention—that you have suggested patentable improvements upon an existing invention—or that your invention has been anticipated throughout, and you should drop it. You should have this information at once. The next steps (the whole procedure of obtaining a patent) will be thoroughly explained to you in our FREE BOOK.

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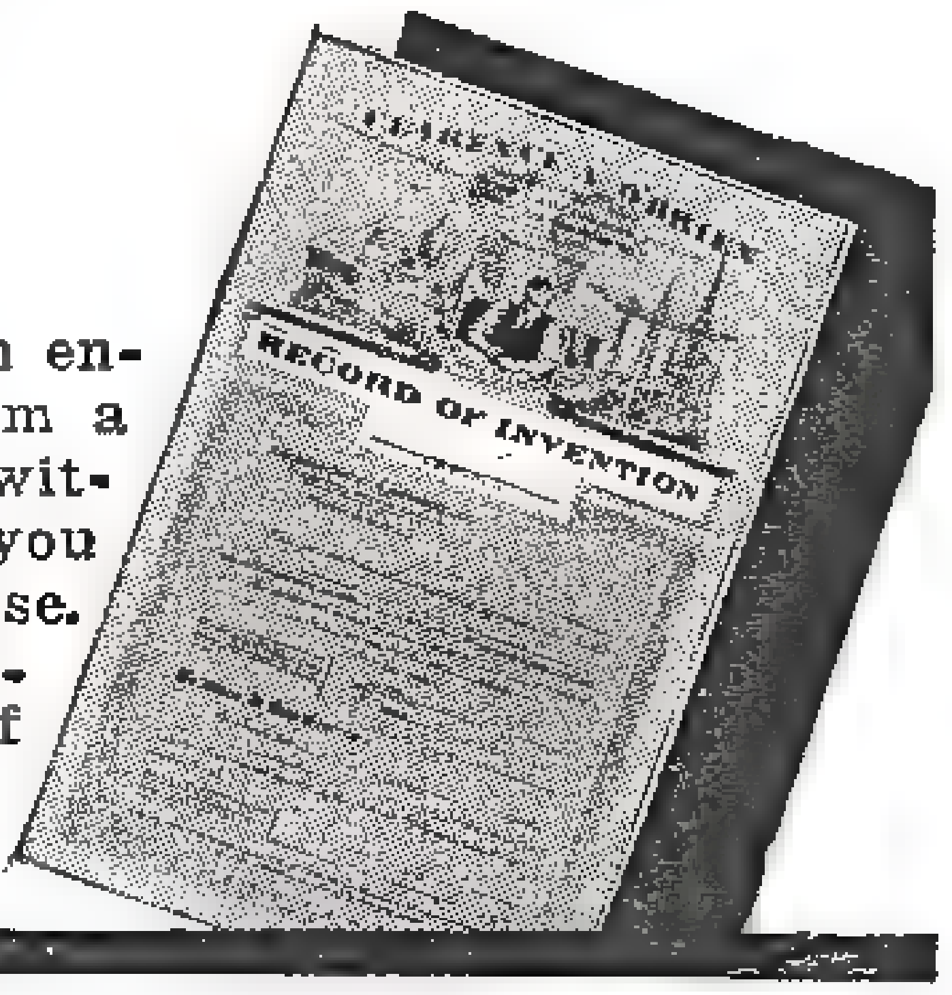
This FREE Record of Invention Form enables you to make in convenient form a sketch of your invention and have it witnessed in a manner of value to you should the occasion for evidence arise. MAIL THE COUPON TODAY and obtain our FREE BOOK and Record of Invention Form.



CLARENCE A. O'BRIEN & HYMAN BERMAN
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PATENT YOUR INVENTIONS *Act Now!*

DELAYS ARE DANGEROUS IN PATENT MATTERS

The Free Book shown here was prepared for inventors, to show them exactly what steps they must take to secure a PATENT. If you have an invention, you should send for this book AT ONCE. It will tell you exactly how an application for a Patent is made, what information you must furnish your attorney, and what steps he must take in order to protect your interests. Remember, inventing an article is one thing—securing the exclusive right to manufacture it, use it, or sell it is another. Without a U. S. Patent, you cannot expect to reap the profits that your invention may make possible. Send at once for this book. After you get that, you'll know exactly what to do to protect yourself.

WHAT A PATENT DOES FOR YOU

Every year thousands of Patents are granted. Very few, however, represent the discovery of entirely new principles. Most of them provide new methods of doing some everyday thing in a better way—changes for greater efficiency, usefulness, adaptability, or beauty in some previously Patented thing. These IMPROVEMENTS are Patentable if new, and actually represent new inventions. These improvement Patents offer large chances for profit if commercially useful. The business world wants improved products and services.

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Anything you write us or send us is strictly confidential between us. All letters and drawings are kept in strong, steel, fireproof files, which are open only to ourselves or authorized members of our staff. We have secured patents for inventors located in every state in the Union. Our organization is a large and efficient one. Our practice is confined entirely to Patents, Trade-Marks, and Copyrights. We have had years of experience in Patent Matters. When you place your invention in our hands, we are in position to proceed at once to secure protection for you. Our fees are reasonable, and, if you desire, we can arrange convenient terms of payment.

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Please understand that you are not under the slightest obligation in sending for this book. We will mail it, together with the Record of Invention form, the same day we receive your request. Use the coupon to save yourself time and trouble. After that, you will be in position to proceed or not as you choose, to make your application for a patent.

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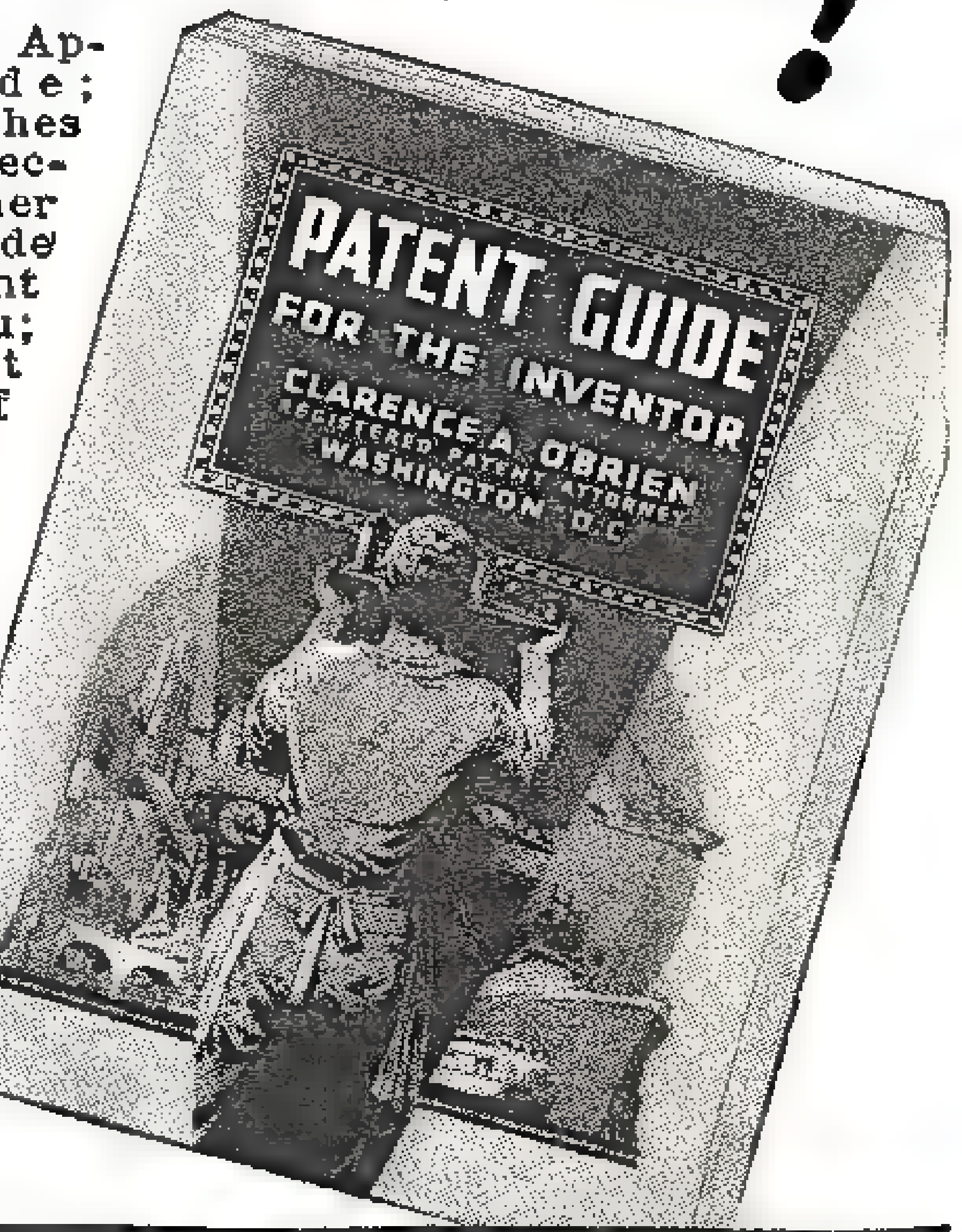
How your Patent Application is made; what kind of sketches or drawings are necessary; what other papers must be made out; how the Patent Laws protect you; why it is important to avoid loss of time in getting your application filed; and many other important points. Even a very simple invention, if new and useful, may prove very valuable. You may have much to gain and nothing to lose by sending for this book TODAY.



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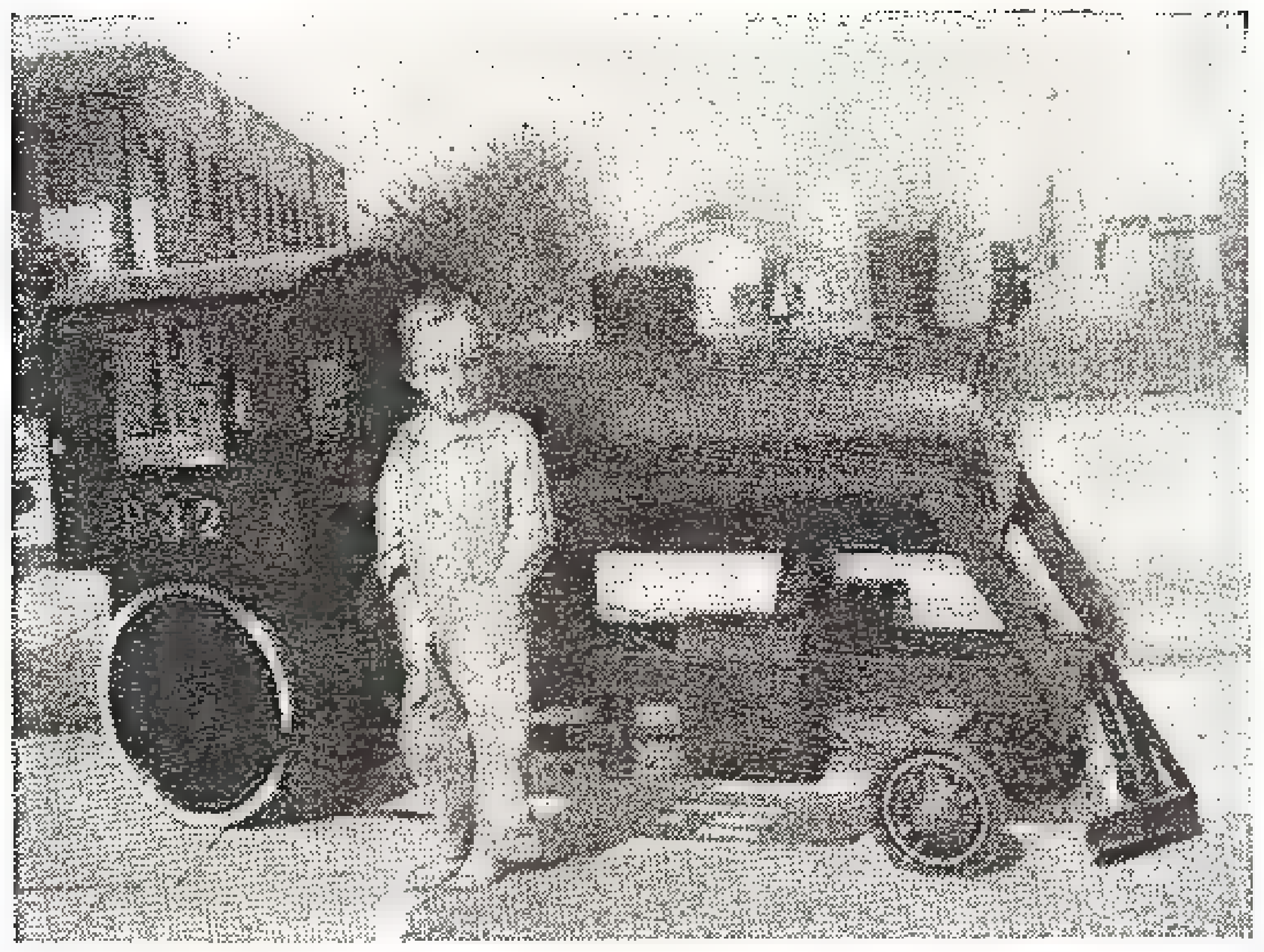
Random Chips from the Editor's Workbench



Equipped with ball bearing wheels, this miniature locomotive pedals as easily as a bicycle. E. L. Bowers, of Los Angeles, Calif., built it from MM plans for little Bobby, 5 years old.

ONE of our business friends has asked us to pick a list of the most important inventions of the past year. Here's our nomination: Rust cotton picker, sonic altimeter, telephone photo improvements, bacteria-killing tubes, television advances, new safety auto tires, defrosters and fog dispellers, the roadable autogiro.

Also: Metal spectrophotometer, improved steel alloys, advances in Diesels, air conditioning, plastics, textiles and glass; the solar heater, improvements in vacuum tubes, the photo-composing machine, power-alcohol plant. With close to 50,000 patents from which to choose, such a list has to be a matter of opinion and we may change ours if we go into this subject further. The merits of the Rust cotton picker, for one, are still a matter of considerable dispute in the South.

***

Topping the list of interesting projects and photos received this month is a letter from E. L. Bowers, of Los Angeles, Calif., who says:

Los Angeles, Calif.

Dear Editor:

Enclosed is a photo of a pedal locomotive made from plans in a recent issue of MM. It was made in a spare room without any special tools.

The wheelbase is 60 inches, and the cab stands 42 inches high. Four small children can ride in it, and how they do pedal it around the block, halting traffic and creating great interest. You may be sure that 5-year-old Bobby, for whom it was built, is the most popular boy in Los Angeles.

E. L. Bowers.

We certainly can appreciate that Bobby is popular in his neighborhood with such a fine model locomotive to travel around in. Mr. Bowers is indeed fortunate to have tackled a project that provides a double measure of satisfaction—the thrill of a workshop project well done, and the pleasure of having constructed something that brings joy to children. A $5 award was sent to Mr. Bowers.

***

To Steele Peterson of Duluth, Minn., goes $3 for his letter and photo of "Skedaddle," one of the many projects presented in the MM "How To Build 20 Boats" book. He writes:

Duluth, Minn.

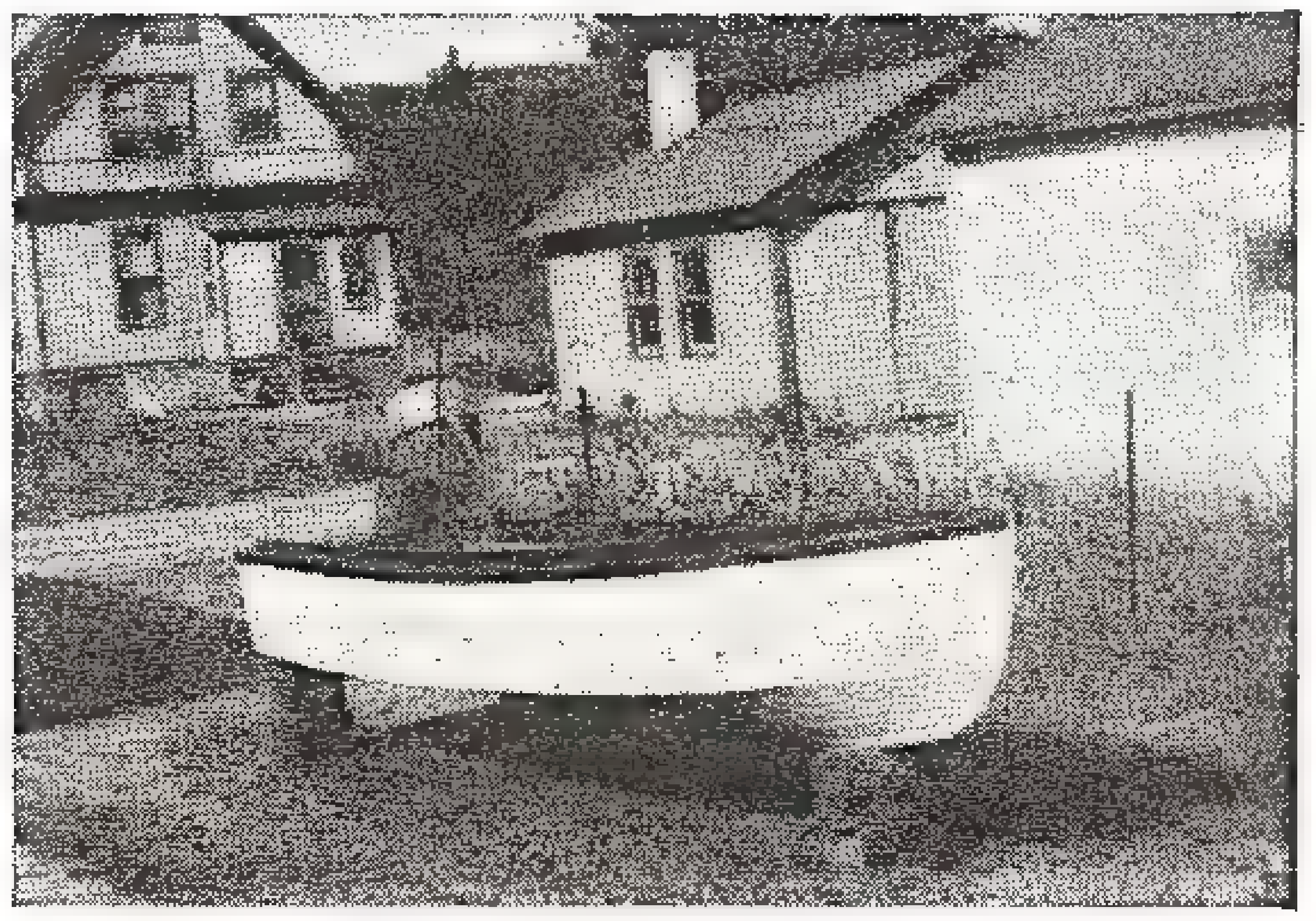
Dear Editor:

Enclosed are photos of the boat my father and I built from plans in the MM boat book. The boat was completed in six weeks using a limited number of tools. I cannot recall any other constructional project which we so thoroughly enjoyed. The cost of materials was only $30.

We launched the boat in a rough sea and were agreeably surprised the way she handled. With a small outboard motor of slightly more than 3 horsepower, we made 12 m.p.h.

I am pleased with MM plans because they are so clear that an amateur can easily follow them. I hope to see more plans for small boats in the next edition of your boat book.

Steele Peterson.



In the short time of six weeks, using a limited number of tools, Steele Peterson and his father, of Duluth, Minn., constructed "Skedaddle" from plans printed in MM boat book.

Good work, Mr. Peterson. When such a seaworthy boat can be built for so little money we can readily understand why so many MM workshop fans are tackling boat projects at this time.

***

From Joseph Lovetri, of Raritan, N. J., comes a letter and photo describing a real good bob-sled project. He says:

Raritan, N. J.

Dear Editor:

Enclosed is a snapshot of my bob-sled. The sled is six feet long and I took your advice about using strap iron for the runners. It makes good speed.

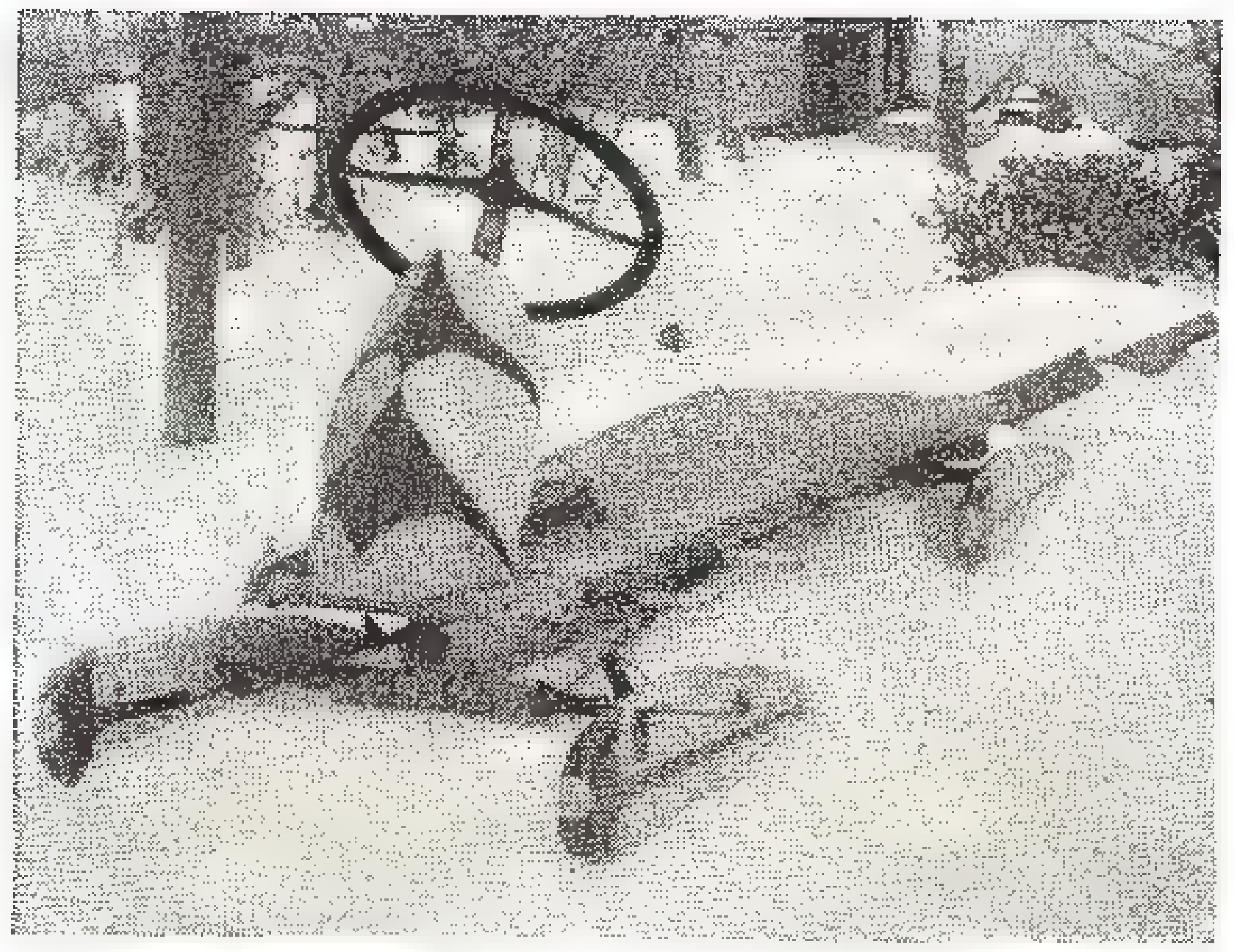
This is my third entry in the Workbench contest. I hope it reaches you in time for consideration this month.

Joseph Lovetri.

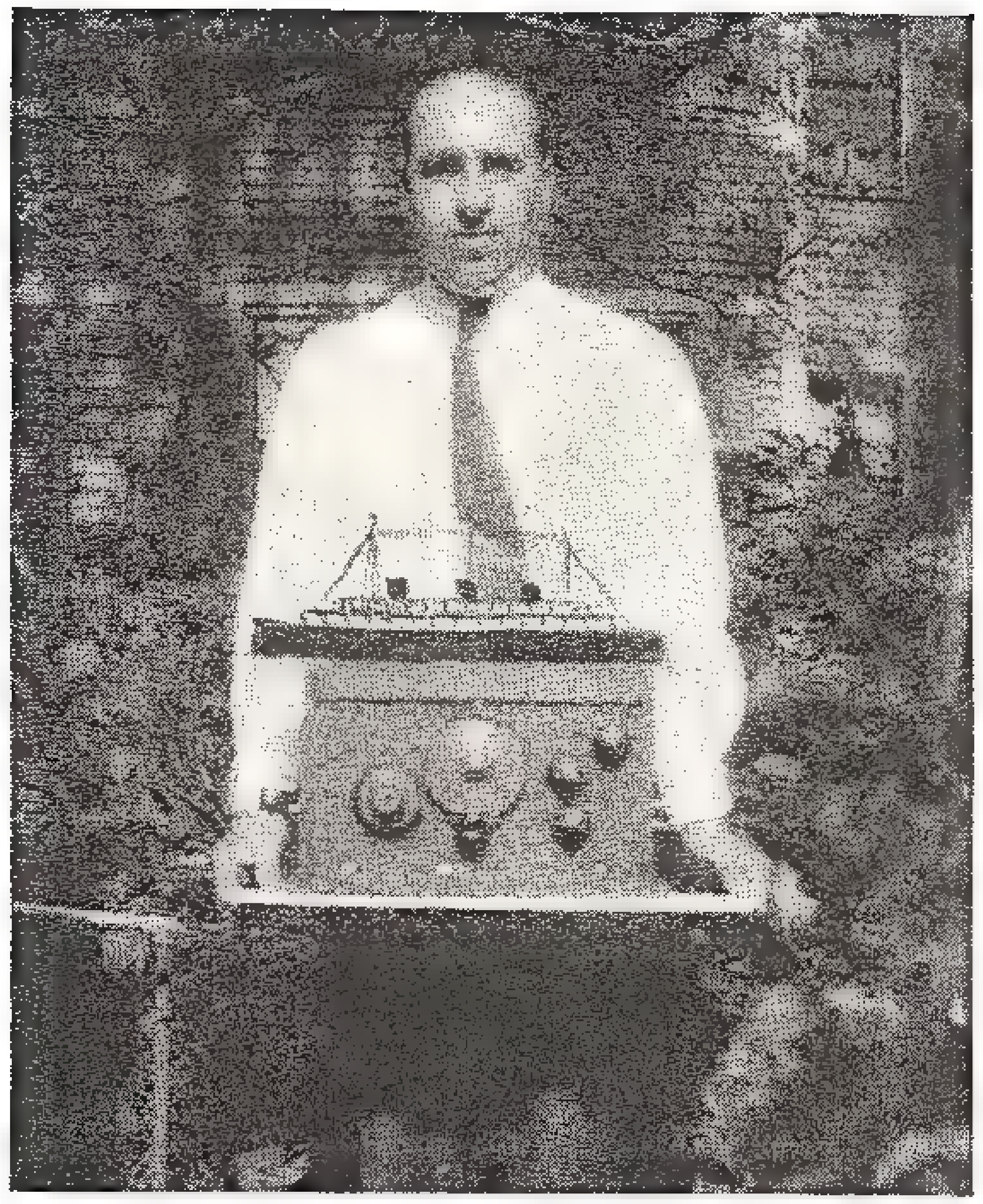
The bob-sled is a keen looking job as most MM readers will agree. A $3 prize was awarded for this letter and photo and since it was his third entry it proves that it pays to keep trying.

***

Showing aptitude for constructing projects of different types, John Marks, of Somerville, Mass., submitted a letter and photo that won an award of $3. His letter states:



This six-foot bob-sled was built by Joseph Lovetri, of Raritan, N. J. Featuring an automobile type steering wheel and runners made of strap iron it seats three persons comfortably.



John Marks, of Somerville, Mass., exhibits two projects built from MM plans—a compact radio set and a carved model of the ocean liner, *Queen Mary*. He received orders for 5 models.

Somerville, Mass.

Dear Editor:

I have been reading MM for many years and think it is the best magazine of its type. It features plans for things to build that do not require a great expense. As yet, I have not found a single department that I haven't read over and over again.

The enclosed photo shows a radio and a model of the "Queen Mary" that I built from MM plans. Since building the "Queen Mary," I have received orders from five people to build similar models for them so you can see that it must be pretty good.

John Marks.

Congratulations to Mr. Marks for turning a hobby into profitable channels. We believe that many more MM workshop fans could turn their skill with tools into a source of income if an effort was made. With the money gained, a bigger and better workshop could be set up.

***

Readers who like to build speedsters will like the letter and photo submitted by Joe Lucan, of Wisconsin Rapids, Wis., who was awarded a $3 prize. His interesting letter states:

Wisconsin Rapids, Wis.

Dear Editor:

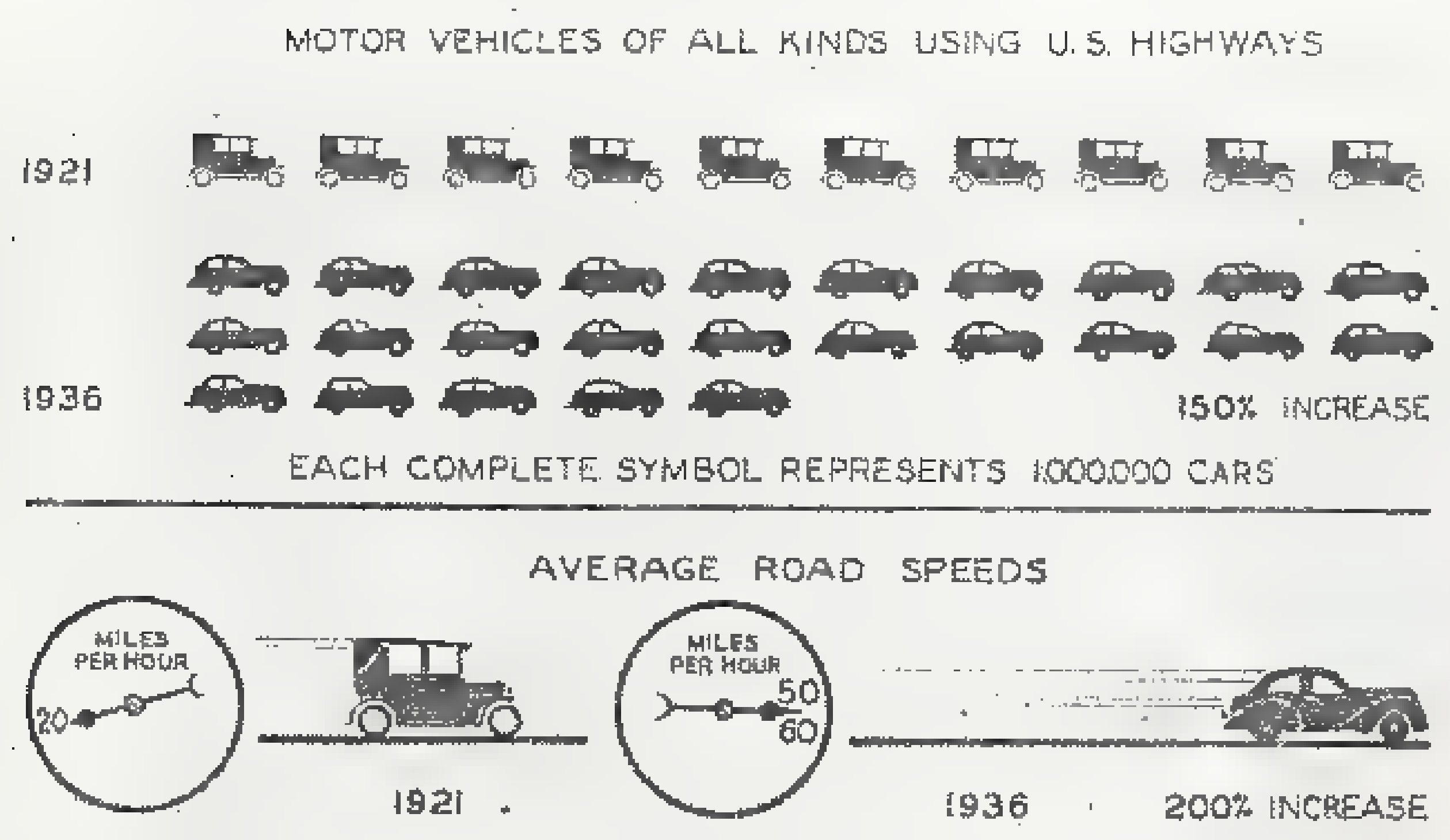
Enclosed is a photo of my speedster which I built from my own design. The chassis is built entirely

[*Continued on page* 32]

Uncorking Bottled Traffic

by Dr. Miller McClintock

Director, Bureau for Street Traffic Research,
Harvard University.



HOW AND WHY TRAFFIC HAZARDS HAVE INCREASED IN PAST 15 YEARS

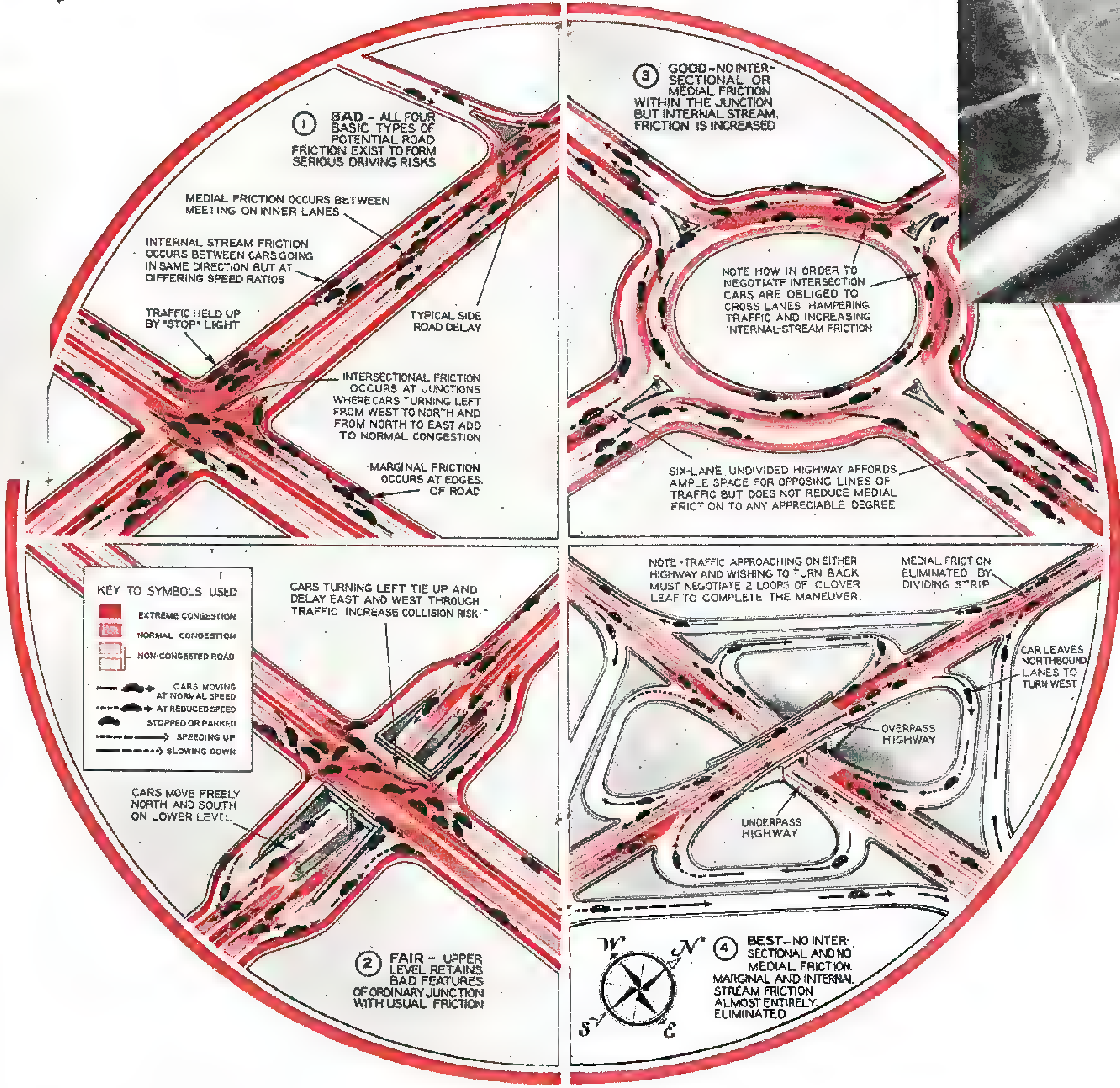
AN IDEA of the problem confronting the traffic engineer may be gained by keeping in mind two contrasting pictures:

Fifteen years ago there were, roughly, 10,000,000 motor vehicles in this country. Today there are two and a half times that number.

Fifteen years ago, and even ten years ago, speed on the road averaged 20 miles an hour. Gradually it went up to 30, then 40, until today speeds of 50 to 60 miles an hour and beyond are considered normal on the open road.

Thus, we have two parallel facts: In the past 15 years the automobile population has increased by 150 per cent, and the rate at which that wheeled population moves along the highways has jumped from 150 to 200 per cent.

As the volume of traffic grew the channels through which it flowed also grew. But they did not grow in a uniform manner, nor as rapidly as the automobile was growing in its speed capabilities. Not that admirable work was not done to have the highway, inherently static, keep pace, as it were, with the faster-developing automobile; the automobile could not have grown in numbers and speed if highways had not developed beyond the horse and buggy stage. But it took money and time to lay the highway network of the United States, by far the most extensive in the world. It has taken even more money and time, once the basic network was finished, to improve the highways to the point where they can accommodate and expedite modern traffic.


① BAD – ALL FOUR BASIC TYPES OF POTENTIAL ROAD FRICTION EXIST TO FORM SERIOUS DRIVING RISKS
MEDIAL FRICTION OCCURS BETWEEN MEETING ON INNER LANES
INTERNAL STREAM FRICTION OCCURS BETWEEN CARS GOING IN SAME DIRECTION BUT AT DIFFERING SPEED RATIOS
TRAFFIC HELD UP BY "STOP" LIGHT
TYPICAL SIDE ROAD DELAY
INTERSECTIONAL FRICTION OCCURS AT JUNCTIONS WHERE CARS TURNING LEFT FROM WEST TO NORTH AND FROM NORTH TO EAST ADD TO NORMAL CONGESTION
MARGINAL FRICTION OCCURS AT EDGES. OF ROAD
③ GOOD – NO INTERSECTIONAL OR MEDIAL FRICTION WITHIN THE JUNCTION BUT INTERNAL STREAM, FRICTION IS INCREASED
NOTE HOW IN ORDER TO NEGOTIATE INTERSECTION CARS ARE OBLIGED TO CROSS LANES HAMPERING TRAFFIC AND INCREASING INTERNAL-STREAM FRICTION
SIX-LANE UNDIVIDED HIGHWAY AFFORDS AMPLE SPACE FOR OPPOSING LINES OF TRAFFIC BUT DOES NOT REDUCE MEDIAL FRICTION TO ANY APPRECIABLE DEGREE
KEY TO SYMBOLS USED
EXTREME CONGESTION
NORMAL CONGESTION
NON-CONGESTED ROAD
CARS MOVING AT NORMAL SPEED
AT REDUCED SPEED
STOPPED OR PARKED
SPEEDING UP
SLOWING DOWN
CARS TURNING LEFT TIE UP AND DELAY EAST AND WEST THROUGH TRAFFIC INCREASE COLLISION RISK
CARS MOVE FREELY NORTH AND SOUTH ON LOWER LEVEL
② FAIR – UPPER LEVEL RETAINS BAD FEATURES OF ORDINARY JUNCTION WITH USUAL FRICTION
NOTE – TRAFFIC APPROACHING ON EITHER HIGHWAY AND WISHING TO TURN BACK MUST NEGOTIATE 2 LOOPS OF CLOVER LEAF TO COMPLETE THE MANEUVER.
MEDIAL FRICTION ELIMINATED BY DIVIDING STRIP
CAR LEAVES NORTHBOUND LANES TO TURN WEST
OVERPASS HIGHWAY
UNDERPASS HIGHWAY
W
N
S
E
④ BEST – NO INTERSECTIONAL AND NO MEDIAL FRICTION. MARGINAL AND INTERNAL STREAM FRICTION ALMOST ENTIRELY ELIMINATED

MARGINAL FRICTION involves contact with a person or object on the edge of the road. It leads to such accidents as striking a pedestrian, telegraph pole or parked car, or running into the ditch.

INTERNAL-STREAM FRICTION involves contact between cars moving over a multiple-lane highway in the same direction but at different speeds. It leads to such accidents as side-swiping a car in passing.

Top left quarter of diagram shows traffic at its worst. Lower quarter shows a fair solution, with through traffic on lower road, but dangerous disadvantages of ordinary junction on upper levels.

Though theoretically traffic flow never ceases in rotary junction (upper right) there is still danger and delay. Cloverleaf juncture of two roads with median strips (lower right) is traffic at its best. There is no congestion, little delay.

MEDIAL FRICTION involves a contact in the middle of the road, as when two cars from opposite directions crash head-on.

INTERSECTIONAL FRICTION involves contact at intersections where streams from different directions come together in the center, forming dams and eddies of traffic. It leads to such accidents as ramming a car in the side and, in addition, to much confusion and delay.

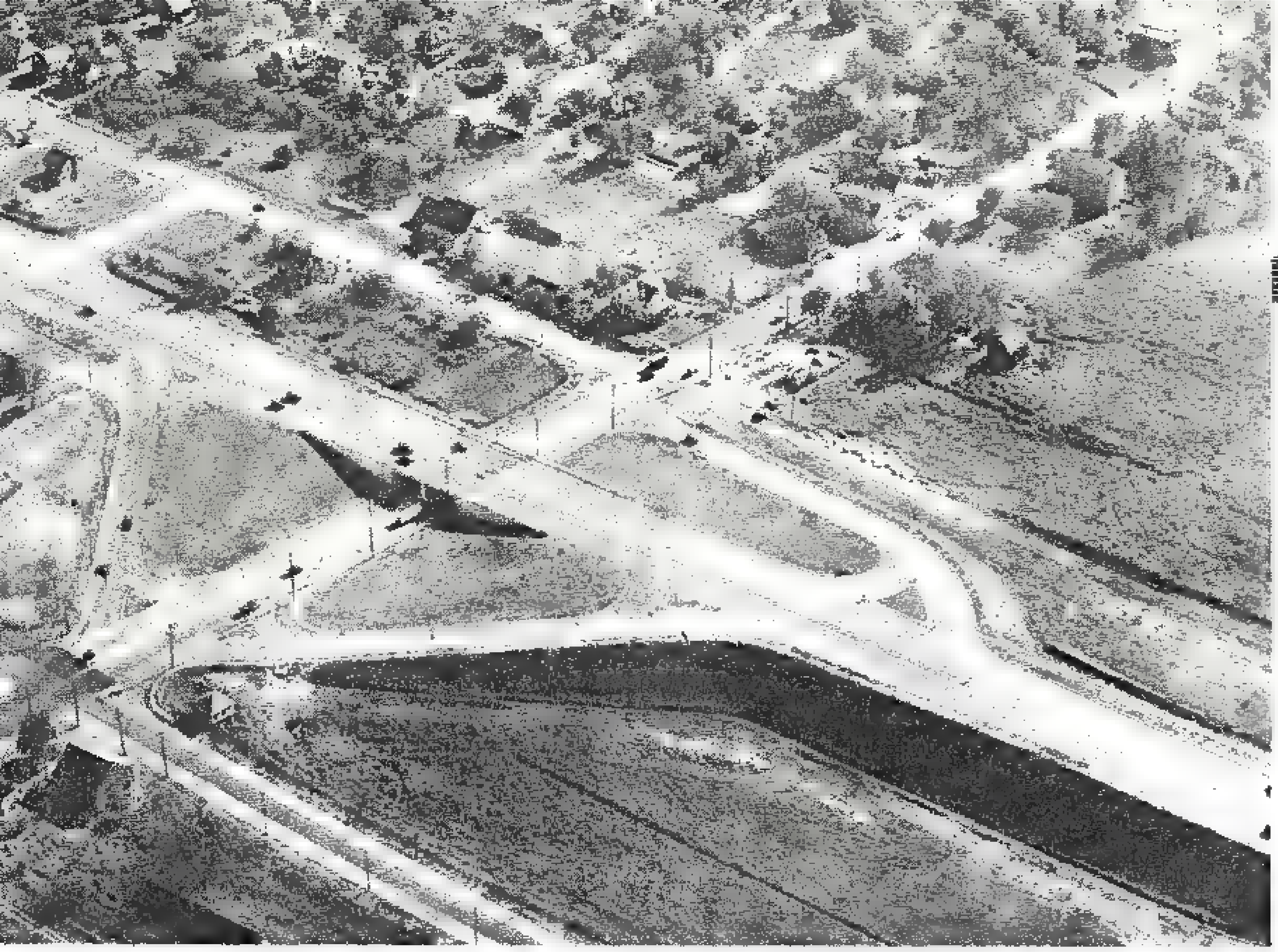
A "Cloverleaf" type highway at Paranus, N. J., keeps up with automobile age. With super roadways crossing, safety is assured by this Limited Way.

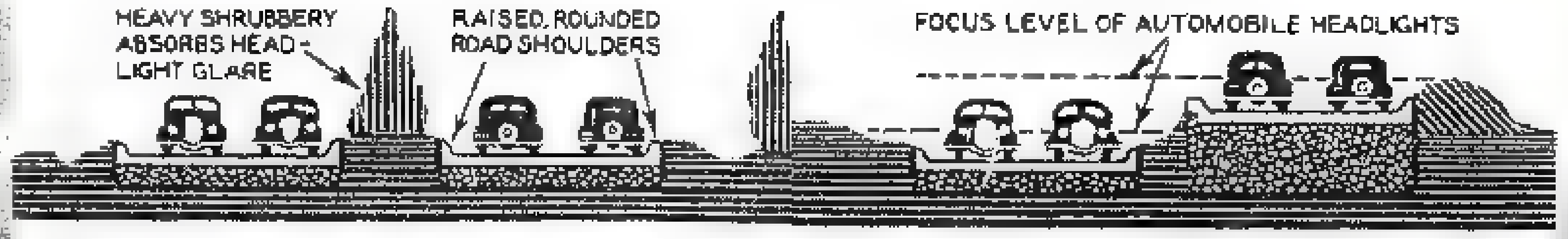
While the automobile was being improved, the better to serve as a means of transportation, and the highways were being extended and redesigned, the better to fit the modern car, two things were happening.

The first, of tragic importance, is that more and more persons were meeting death and injury on the highway. In 1913 all deaths by motor vehicles totaled only 4,200. Five years later the number had multiplied by two and one-half times. Nearly 40,000, more than three and one-half times the 1918 figure, were killed last year. In addition, 105,000 others were crippled permanently and more than 1,000,000 injured.

The second was the growing congestion of traffic, particularly in large cities. Congestion impairs the use of the automobile, defeating the very purpose of rapid and free motion for which it was built; it also costs enormously. In New York City alone it has been estimated that delays due to traffic congestion cost motor vehicle owners $1,000,000 *a day*. While dire prophesies of a saturation point for automobiles are no more to be taken seriously today than when we had one-third the number of cars (when such prophesies were most loudly uttered), they point to the need for correction. A man will not want to buy an automobile if he cannot make use of it without undue inconvenience and undue risk.

For years everyone has referred to "the stream of traffic"—an inspired popular antici-




HEAVY SHRUBBERY ABSORBS HEAD-LIGHT GLARE
RAISED, ROUNDED ROAD SHOULDERS
FOCUS LEVEL OF AUTOMOBILE HEADLIGHTS

SECTION THRU TYPICAL LIMITED HIGHWAY ILLUSTRATING ITS SAFETY FEATURE

SECTION THRU NEW GERMAN LIMITED WAY WITH STAGGERED TRAFFIC LANES

Traffic intersection near Englewood, N. J., which provides through traffic on both upper and lower highways (left).

●

Below: Germany's magnificent new speedway, between Frankfort-on-Main and Darmstadt. Note newly planted foliage in center to absorb glaring lights.

An American two-way highway, winding over hill and dale, speeds traffic in rural areas on smooth ribbons of concrete.

●

Staggered traffic lanes on Germany's Reichsautobahnen between Munich and Holzkirchen. Diagram at lower right shows how blinding lights of passing cars are diffused.

pation of what the traffic engineer has come to consider the basic concept of the traffic situation. Traffic moving over a highway has many of the characteristics of water flowing over a river bed, and it obeys similar principles of hydraulics. In other words, as traffic speeds along, turning and twisting and stopping and starting, it encounters four types of friction, as outlined on pages 42 and 43. Analysis of thousands of accidents and near-accidents, and of the elements that create confusion and delay on the road, has shown that all of these traffic hazards and inconveniences fall into one or another of these four kinds of friction.

With these principles in mind, the traffic engineer today not only can diagnose but prescribe for every traffic ill. The Limited Way is the application of these principles. It is a highway designed to move the greatest volume of traffic rapidly and safely.

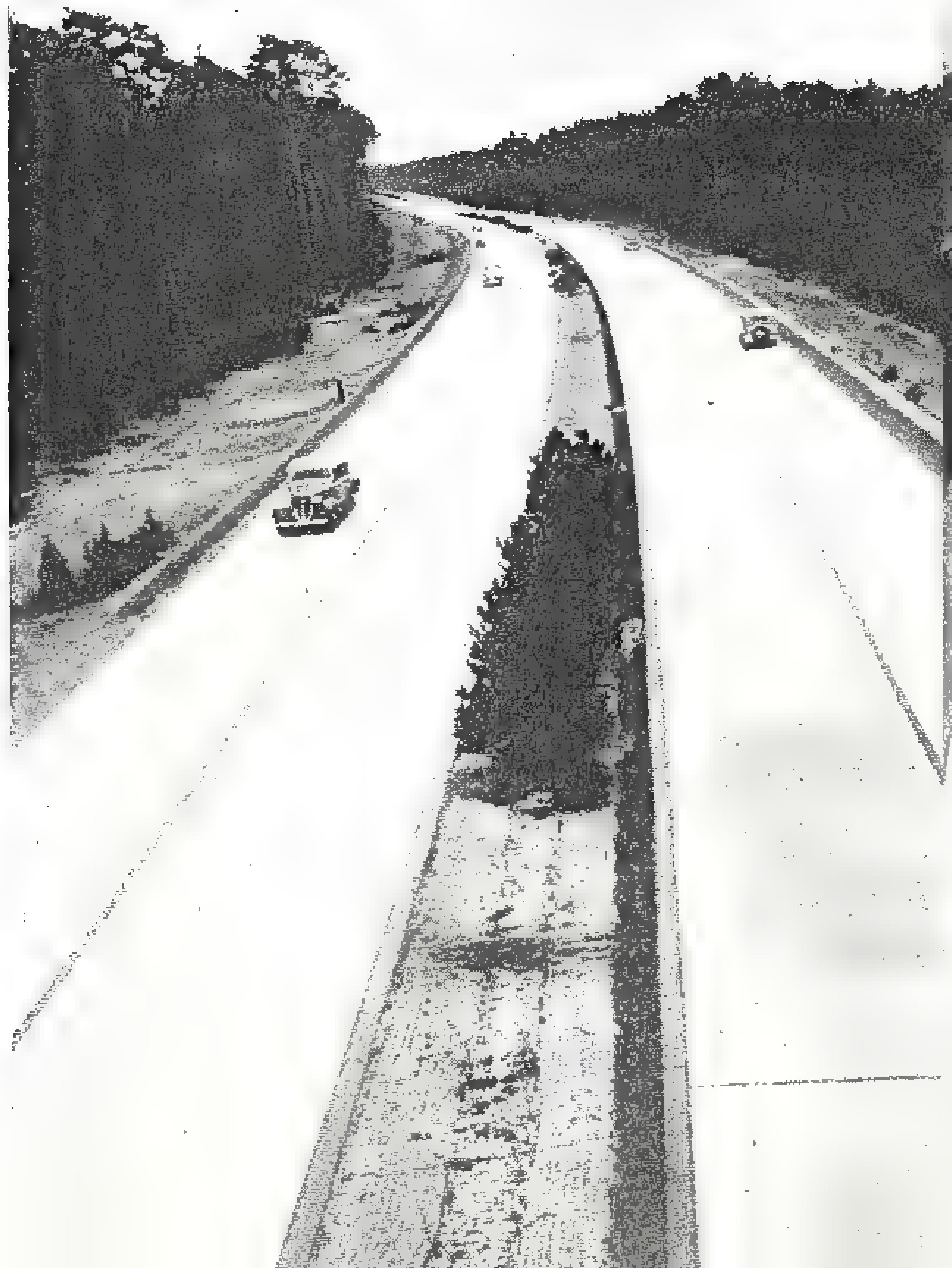
The Limited Way eliminates medial friction by a raised strip down the center that keeps opposing streams of cars entirely separate. This division of the streams reduces interstream friction, since a driver can take his time about passing a car without fear of being struck by an on-coming car. Again, the Limited Way reduces marginal friction by having the edges rounded and raised, so that there is little danger of going off the road; and by a barrier which prevents cars from a side road from cutting into the main stream except gradually. Cars enter the side road from the Limited Way by first going into a deceleration lane at the right.

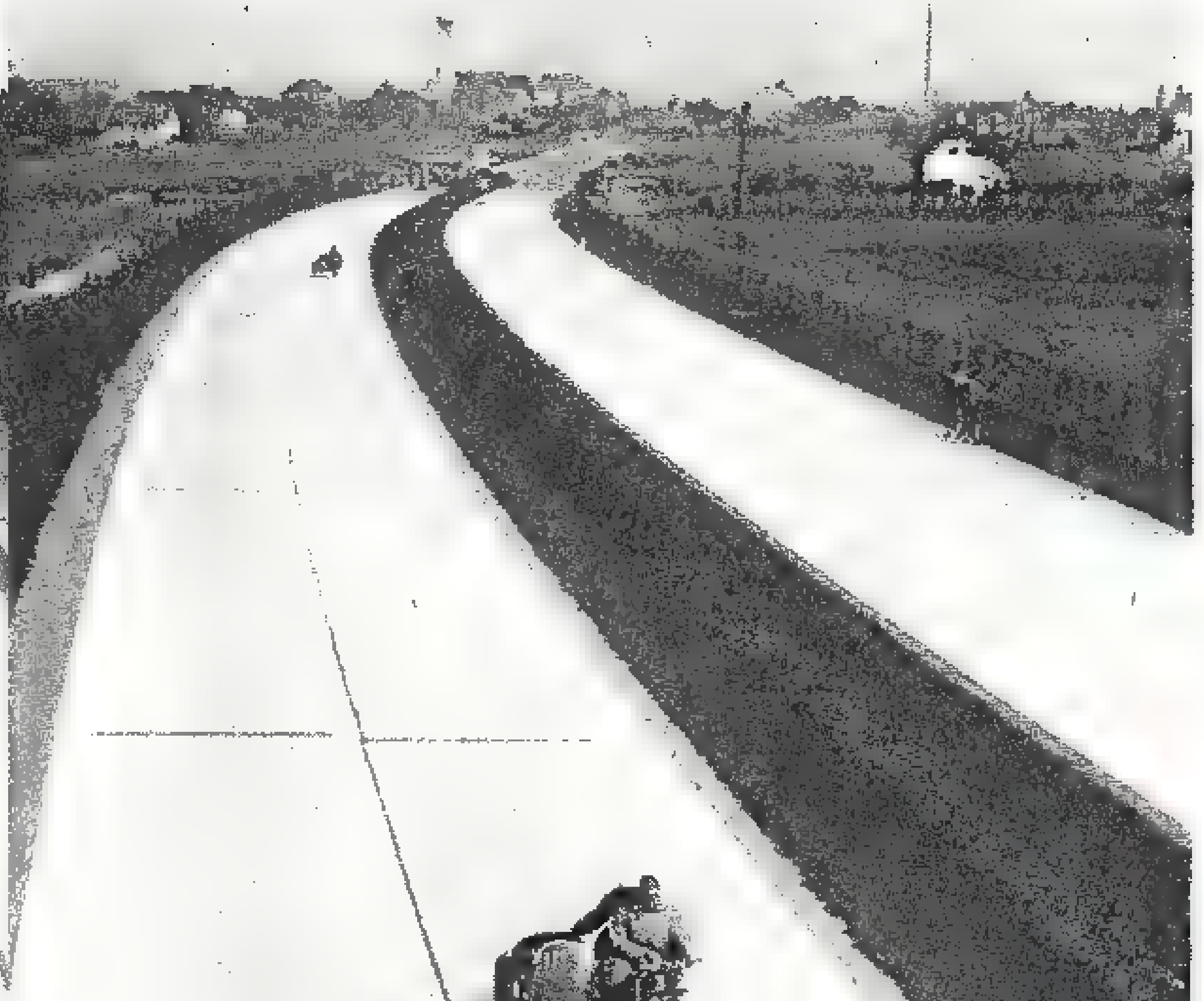
And, lastly, the Limited Way minimizes intersectional friction by making use of the clover leaf. The clover leaf represents an evolution similar to that of the straightaway. As traffic volume and the speed of automobiles grew, it became apparent that the simple junction, with the four streams of traffic—two on each road—cutting across one another on the same level did little to prevent confusion, handmaiden of accidents. The cars stopped by the red signal jam together; cars turning left on the green light block the passage of those trying to move with the signal, while both the left turning cars and the right turning cars crowd together, jockeying to get through. The result is often a ram amidships.

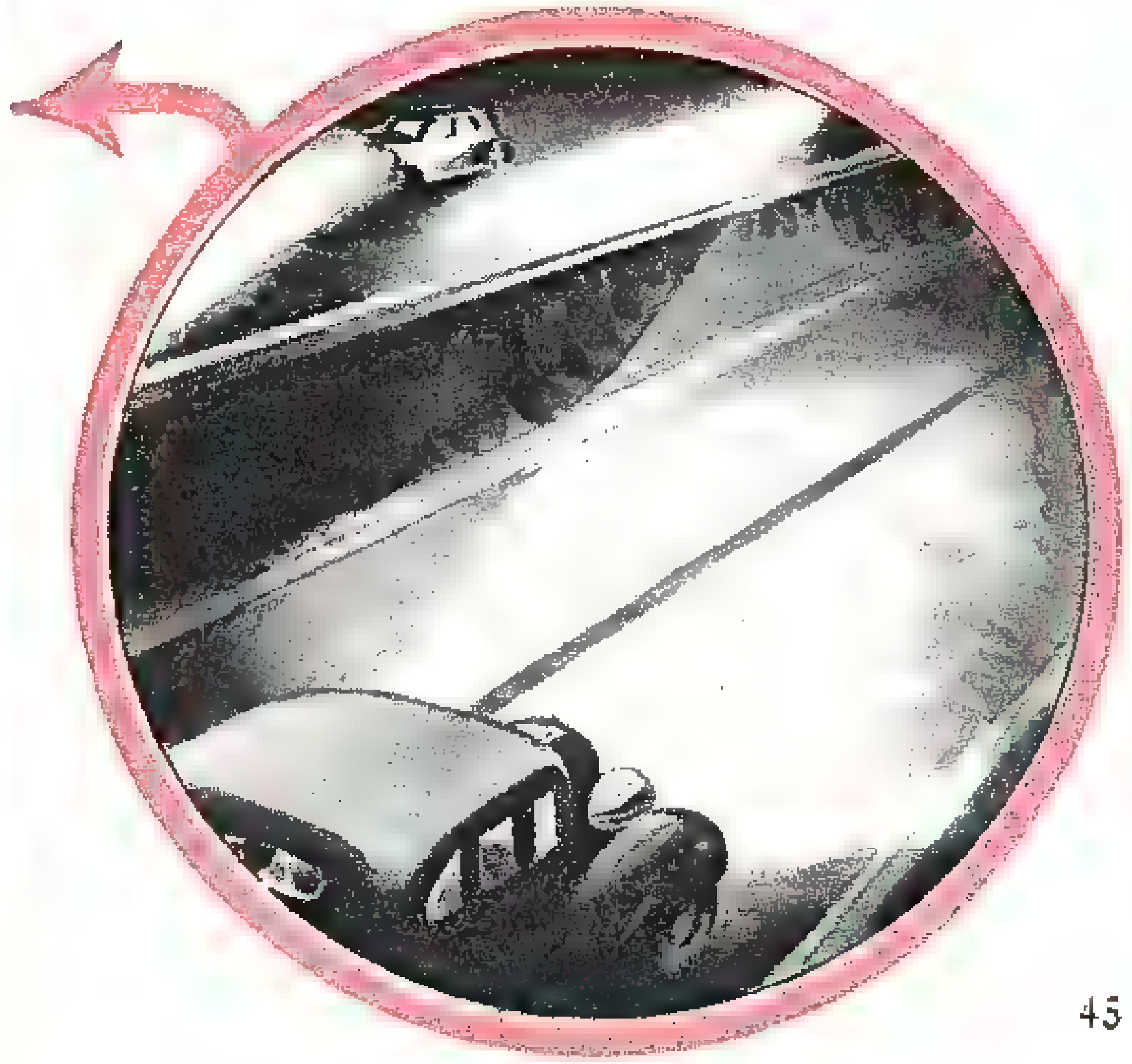
By depressing one of the highways at the intersection some good was accomplished, for through traffic on the lower level could proceed right along. But cars emerging from the lower level onto the upper must squeeze into the fast moving stream above. Cars on the upper level, making left turns to reach the cross highway, must make an even more difficult maneuver, dodging both the traffic behind them and the opposing traffic, and keeping clear of cars making left turns from the opposing lane.

The rotary junction is better, for it eliminates the danger of cars approaching at right angles to each other, from which head-on crashes occur. Although, in principle, traffic can move freely around the circle, cars have to swing from one lane to another. The result is generally confusion and delay, and often sideswipes and rear-end smashes.

Virtually all these difficulties and risks disappear with the clover leaf intersection of the type that New Jersey has pioneered in building, to take care of the immense traffic streams created by the Holland Tunnel and the George Washington Bridge. If the clover leaf junction is of two highways having a raised strip in the middle to divide opposing lines of traffic, then the safest intersection







THE WORLD'S BIGGEST ARMY

Facing war on wide fronts from foes in both Europe and Asia, the Soviet has built up the vastest fighting machine of today. Here is how it works—and why it might fail.

Brains for the brawn of the mighty Red Army: Seated, (left to right) Tukashevsky, Commissar of Defense, a former aristocrat and slated commander-in-chief in case of war; Voroshilov, Commissar of War; Vegesov, chief of staff. Standing, Budonney, chief of Cavalry, and Bleucher, head of Far East Army. Top photo shows peasant cavalry in mountain maneuvers.

by Joseph M. Baird

THE chimes in the ancient clock-tower of the Kremlin strike ten. For hours troops have stood in Red Square, shifting their feet for warmth against the cold as they await the arrival of Joseph Stalin and other members of the Communist hierarchy in the reviewing stand atop Lenin's tomb just across the plaza. No sooner have the chimes ceased than Stalin, accompanied by a dozen dignitaries, appears on the parapet.

A black charger, bearing a trim, gray-haired figure in uniform, his sword raised in salute, dashes into the square, passes the line of rigid troops, now at attention, and, wheeling up before the reviewing stand, salutes the leaders. Four military bands strike up the "Internationale," the Communist anthem.

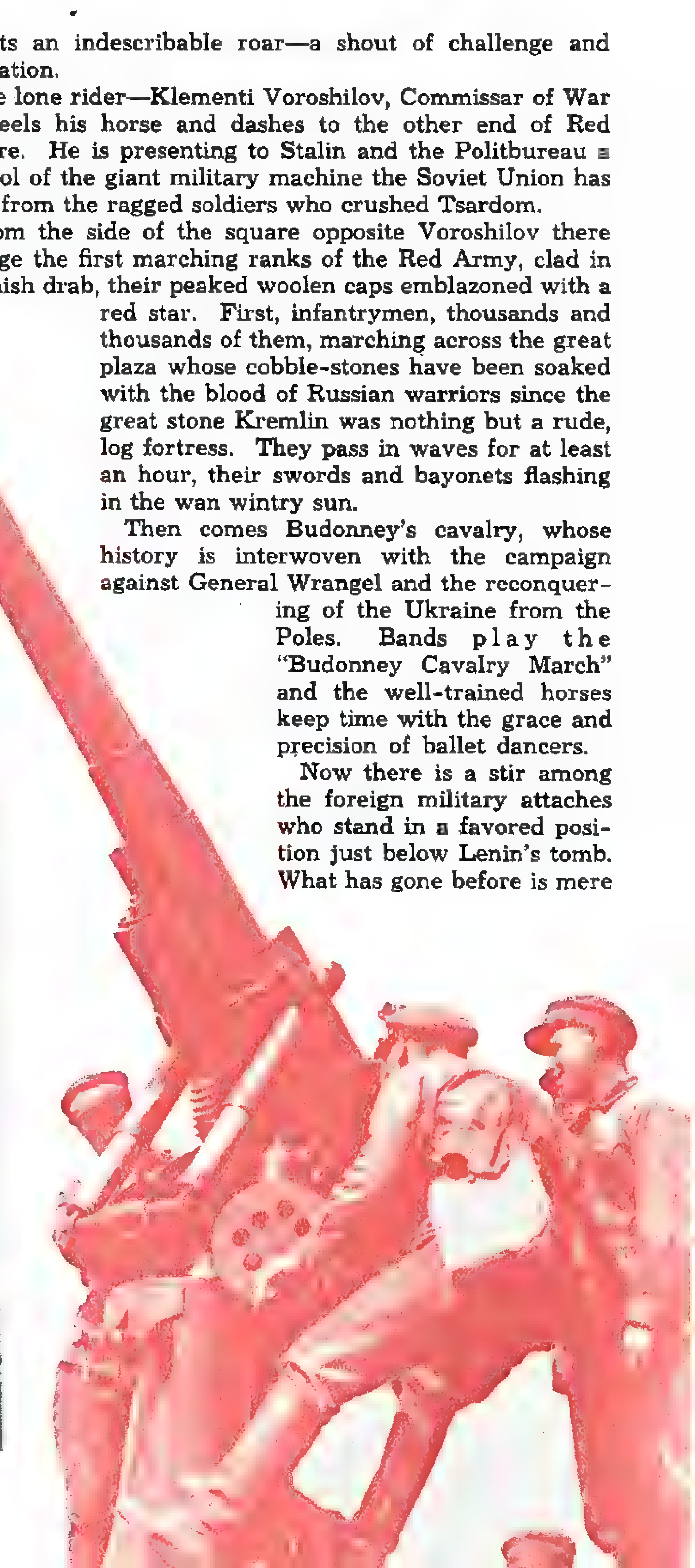
When the last notes have died on the winter air there comes from thousands of deep throats an indescribable roar—a shout of challenge and exultation.

The lone rider—Klementi Voroshilov, Commissar of War—wheels his horse and dashes to the other end of Red Square. He is presenting to Stalin and the Politbureau a symbol of the giant military machine the Soviet Union has built from the ragged soldiers who crushed Tsardom.

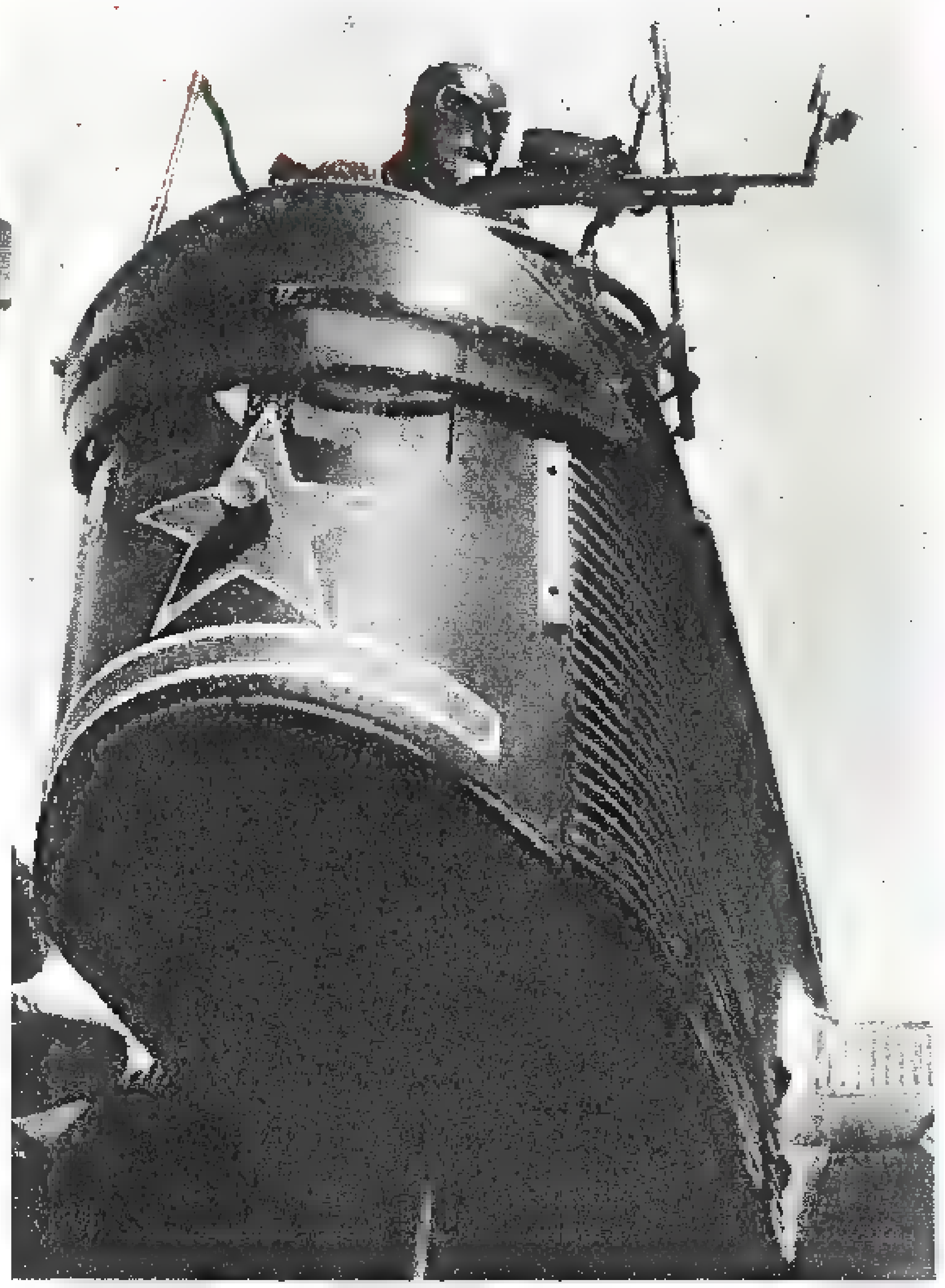
From the side of the square opposite Voroshilov there emerge the first marching ranks of the Red Army, clad in greenish drab, their peaked woolen caps emblazoned with a red star. First, infantrymen, thousands and thousands of them, marching across the great plaza whose cobble-stones have been soaked with the blood of Russian warriors since the great stone Kremlin was nothing but a rude, log fortress. They pass in waves for at least an hour, their swords and bayonets flashing in the wan wintry sun.

Then comes Budonney's cavalry, whose history is interwoven with the campaign against General Wrangel and the reconquering of the Ukraine from the Poles. Bands play the "Budonney Cavalry March" and the well-trained horses keep time with the grace and precision of ballet dancers.

Now there is a stir among the foreign military attaches who stand in a favored position just below Lenin's tomb. What has gone before is mere



Artillerymen of Workers and Peasants Army spot sky raiders. Soviet war machine is prepared to meet air attacks in both Europe and Asia.



Below—Bow of a bomber. Soviet pilots have reputation for bravery and skill, but experts criticize slowness of planes, call motors inferior.

routine to them, for they have seen hundreds of parades. But in the distance sounds the rumble of tanks. How many will there be and of what type? They are keenly interested in the Red Army's mechanization program.

At the last review I witnessed in late 1935 there were about 550 tanks varying in size from the little "whippets" manned by one soldier and carrying only a machine gun, to the mammoths which can crush a stone building and carry a 3-inch cannon. That this number of tanks can be assembled and complete their run through Red Square with only one or two dropping out for repairs attests increasing technical efficiency.

Then comes the artillery, the standard types employed by all powers: Searchlight batteries, aircraft sound detectors, portable wireless—nothing unusual in this.

Again the military attaches show interest. In the distance they hear the hum of planes. For 20 minutes the sky is darkened by a vast armada—attack planes, observation ships, fast, stream-lined "chasseurs"—but only a few—and then several squadrons of giant four-motored bombers, among the largest military planes in the world. In all, nearly 600 fly overhead, a vast demonstration.

But the ability to parade is no criterion of an army's strength. What is the Red Army? How does it compare with the troops of the Tsar? How would it stand the test of war?

As about most things Russian, there is a tendency, even among military men, to go to fanatical extremes in discussing the Red Army. It is either a "formidable menace to the capitalistic world" or "an ill-organized group of peasants with no staff ability."

One difficulty in making any reliable estimate of the Red Army's strength results from the extraordinary secrecy surrounding it. Mystery is in the very soul of Russia, and it has been intensified under the Soviets by their belief that the whole capitalistic world is their enemy.

Hence it would be presumptuous to attempt here to give more than a general picture, drawn from the Soviet press, two years of residence in Russia and numerous talks with military attaches.

The truth about the Red Army lies somewhere between the two extremist estimates cited. Statistically, it is a standing army of 1,350,000 men, the largest personnel in the world. Its soldiers are recruited on a basis of universal, compulsory military service for two years, except in the technical branches, where enlistment may be for as much as four years. Formerly it was organized on a "territorial" basis—that is, most of its soldiers served in their home districts—but lately it has been placed on a "garrison" status, which means that about 75 per cent of the troops are stationed at places of strategic importance.

No official figure for Red Army reserves has ever been announced, but a representative of the War Office told the All-Union Executive Committee recently that reserves equalled those of 1914, just before the World War. Then they totalled 10,000,000 men, and that may be taken as a reliable current figure.

Russia's army is highly mechanized; just how highly no one outside the War Office and the Kremlin knows, but as long ago as January, 1934, Voroshilov boasted that its mechanization was higher per man-power unit than that of either the British or American armies. There may be, of course, a higher percentage of machine guns, tanks and armored cars per man-power unit, without this equipment being equal in quality to that of some of the other armies. A military attache of one of the large powers with whom I discussed this question asserted positively that the Russian equipment was inferior in quality. However, he added the point that, if Russia had sufficient technical equipment, it could make up in sheer quantity what it lacked in quality.

In the field of aviation close secrecy also is observed, but here it is possible to be somewhat more specific. A strength of 7,000 planes was announced in November. A figure near that is generally accepted by foreign military attaches in Moscow.

Russian pilots have a reputation for bravery, skill, quick-thinking and prompt nervous reflexes—the qualities of an excellent flier. But, in the opinion of foreign military men, the material of the Russian air force is considerably inferior to that of Germany, Italy, Great Britain and the United States. Indeed, Voroshilov has publicly admitted that the great weakness of the air force is the inferior quality of its motors. Russia has imported some foreign engines, but manufactures nothing comparable to the 1,250-horsepower giants which drive the latest types of American military planes.

The Soviet state, probably because of the threat of prompt retaliation by air which it wants to hold over Japan to discourage that country from invading Siberia, has placed great emphasis on heavy bombers. I have seen in the air at one time as many as three squadrons of these giant, four-motored ships with a tremendous bomb carrying capacity, and they came from a single field in European Russia. It is understood that most of them are stationed in the Far East, in the area around Vladivostok. They are capable of

[*Continued on page* 138]

Training of girls like these in parachute jumping is part of Russia's vast preparedness program. Lower photo shows Army tanks lumbering along village road in war practice. Tanks can also swim rivers.

Red soldiers man a machine gun in forest. The best dressed of all the Russians, snow and freezing weather fail to faze them on their icy battlefields.

This big gun is easy to unlimber as it lumbers up to firing line on caterpiller wheels. The Red Army, biggest in world, is said to have highest percentage of technical equipment per man of any fighting force. Besides standing army of 1,350,000 men, there are 10,000,000 in reserve.

FIGHTING OIL WELL FIRES

Going to work in asbestos suits, daredevil flame-eaters are happily at home in the raging infernos of Nature gone wild, and danger only adds zest to their lives.

by Gerald F. Benedict

LIKE a roaring cyclone, a 75,000,000 cubic foot gas well three miles off shore in Lake Maracaibo, famous Venezuela oil region, prematurely blew in wild and caught fire, a huge weaving 200-foot torch blazing out of the water.

The raging fury offered a problem local engineers could not solve. Capping a wild gasser on land is difficult enough, but one out in the water had even the experts stumped. In the excitement someone thought of Myron M. Kinley, oil well fire fighter of Houston, Texas.

"Get Kinley!" is the cry in the oil fields of the world when anything goes wrong and fire breaks out. Immediately the radio spluttered an SOS to Kinley, and a few hours later he and his brother, Floyd, of Tulsa, Oklahoma, were on their way by plane to tame the wild geyser, which belonged to the Largo Petroleum Co., a subsidiary of Standard Oil.

While the brothers were enroute the big gasser unexpectedly turned into a 6,000-barrel oil well and, of course, blazing. This changed the problem.

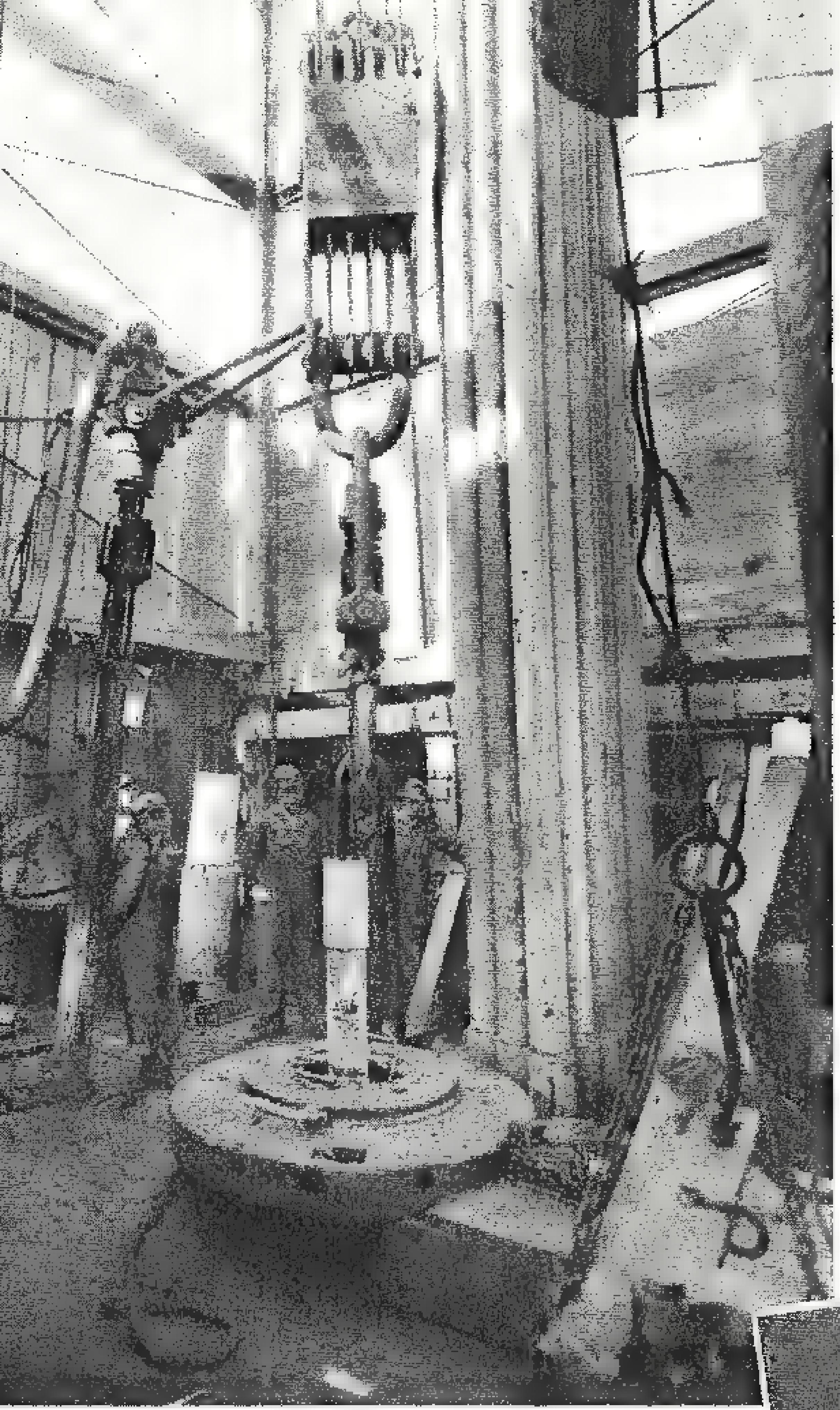
When the Kinleys reached Maracaibo and saw what they had to tackle they decided that the only thing to do was to let the well burn while they devised a way to stop it. What they did amazed engineers and, when it was all over, even the Kinleys were surprised themselves at their success.

Picking up a huge 94-foot, 25,000-pound derrick in a single piece, they towed it intact on three barges to a spot 600 feet from the blazing well. Then they drilled an offset well, slanting to the base of the blaze. Tapping the oil sand at the bottom and pumping mud and water at the base of the fiery geyser, they automatically shut off the flow of oil.

Next the Kinleys placed a special cap, set in cement, at the mouth of the well to prevent oil from seeping into the lake when the well was re-opened and placed on production. As the brothers frantically dug into the lake bottom to douse the geyser, there was always the threat that flaming oil would pour onto the surface of the lake, with staggering damage. It had happened once before in the case of another well, and the oil companies were swamped with law suits after the burning oil had traveled over the water to the city of Maracaibo, with a population of more than 100,000, and nearly wiped it out in addition to damaging

Oil well blazing in Lake Maracaibo, Venezuela, with flames shooting 200 feet in air (left); below, the Kinley brothers, in asbestos suits, pull out hot metal to prevent fire recurring after flames are extinguished by "bombs."

Myron M. Kinley, world's most famous oil well fire fighter and (inset) Tex Thornton, another man at home in a roaring inferno.



Derrick floor of a drilling well. Heavy equipment is often blown sky high by premature wells, and in case of fire is molten and must be removed.

a dozen other beach towns along the way.

Their unique fire fighting feat accomplished, Floyd casually admitted that he guessed an entire steel derrick had not before been hauled to the scene by barge.

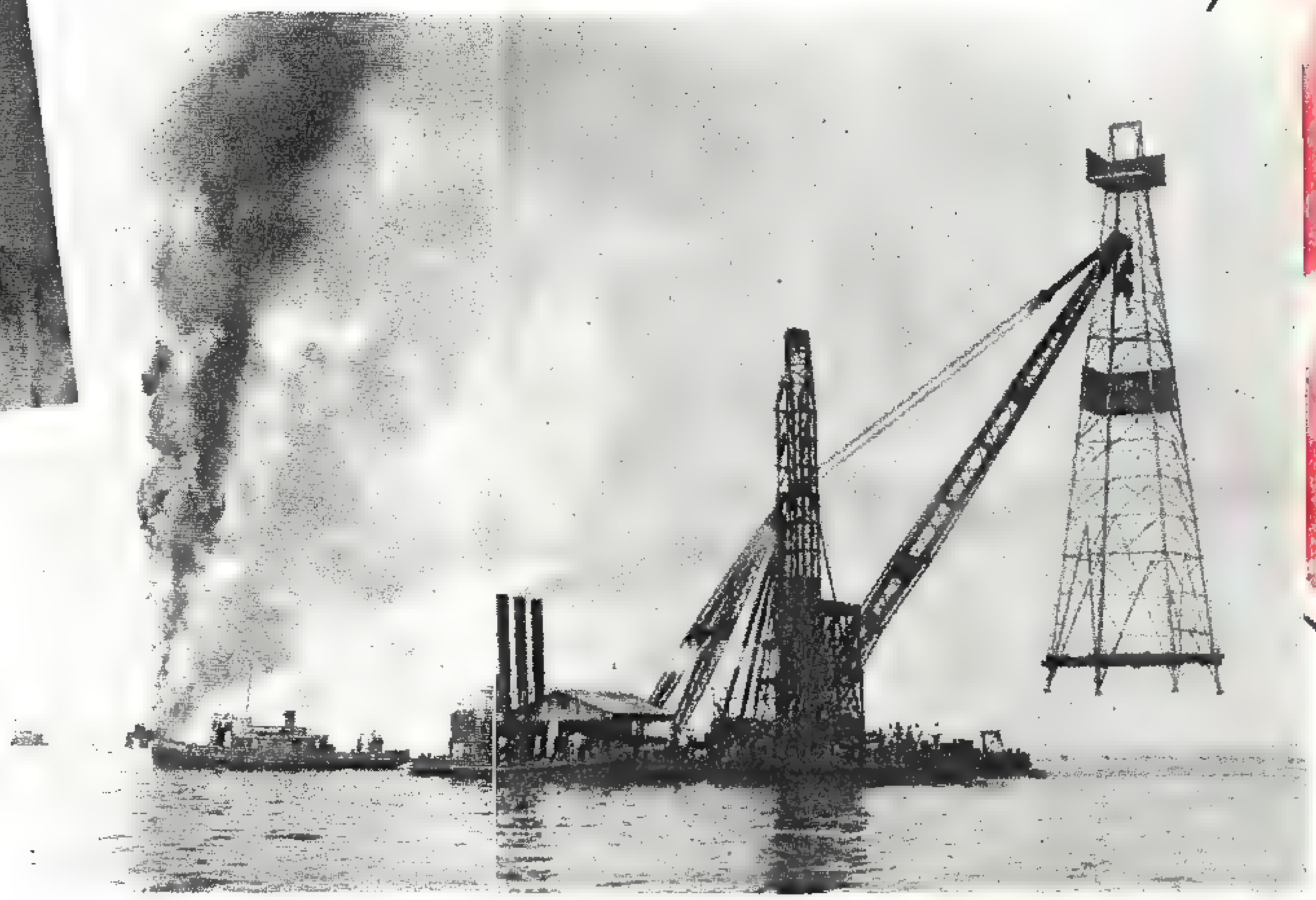
To this engineers agreed. The usual method of moving rigs of such huge dimensions is to tear them down and rebuild them on the new site. It generally requires a week to tear down and another week to rebuild, but a high powered crew has been known to demolish and re-erect a derrick on land in 48 hours. It would have been next to impossible to do this in water.

Answering long distance fire alarms is nothing new to the Kinleys. They have tamed a hundred oil and gas well fires in American fields, while Myron also has subdued fires in Mexico, the Argentine, Colombia and Roumania. The Venezuela expedition was Floyd's first trip to a foreign field.

Myron Kinley first came into international fame following his successful six months' battle with the world's most famous oil well fire—that of the Standard Oil well in Moreni, Roumania—which burned for 18 months, killing nine men and injuring scores of others before Kinley took charge. Traveling with full equipment by land, sea and air from his office in Houston to Roumania, Kinley made the longest fire run on record—7,000 miles.

Something of the problem confronting Kinley in extinguishing the man-made volcano in Roumania may be imagined if you can visualize a crater 260 feet in diameter at the surface in which a blaze 60 feet wide sends a steady, roaring flame 30 feet over the top of the crater. Developing a temperature of 3,000 degrees Fahrenheit, the fire consumed 250,000,000 cubic feet of gas a day, a supply sufficient to meet the entire domestic needs of Detroit, Michigan, for ten days.

Recalling that job recently, Kinley said: "That fire was the meanest I ever worked on. The well caught fire on May 22, 1929, and burned until November 4, 1931. Tunnels, dug to tap the gas flow from beneath the surface, had caved in and gas seeped through the ground in a wide area and spread the blaze. But it wouldn't have been so bad if we hadn't been delayed so much by Government red tape. Old World superstitions about fooling with the phenomenon of Nature added to the difficulty. We had to show this and that committee that we could put out fire with explosives. Fear and ignorance played its part. Danger, ingenuity, perseverence and the help of the Lord, according to the Roumanian papers, were combined in extinguishing the blaze. They should have included the King, too, for it was not until the arguments were ended by his decree that we finally were able to get to work.



Floyd Kinley, chief assistant to his famous brother. At right is blazing well in Lake Maracaibo, Venezuela, which the Kinley brothers put out, transporting 25,000-pound steel derrick intact to scene of action, an engineering feat which was unusual in itself.

"After shooting the walls of the crater with innumerable charges which smothered the outer blaze with mud and dirt, we succeeded in installing a 30-foot metal stack in a manner that drew the flames to a central point. Several times after the fire had been snuffed out, it re-ignited from the hot ground and pieces of molten metal we could not remove. When the fire finally was definitely out, we connected the gas flow to the lines of a gasoline plant, and it is still functioning."

But what causes these dread fires? As the well is drilled, casing pipe is inserted to protect the hole from water seepage and cave-ins. When the oil or gas sand is reached, the drilling tools are withdrawn and control valves placed on top of the casing and connected with storage tanks. This is done just before drilling into oil or gas sand because, as a rule, oil or gas does not immediately flow when sand is struck.

It is the well shooter's job to tap this sand. Oil sand is like a sponge, and may be from three to 150 feet thick. From five to 300 quarts of nitroglycerin are lowered down the casing to the well's bottom and set off. The explosion breaks up the oil sand, so that it releases the oil much as a soaked sponge releases water when pressed. Gas pressure pushes the oil to the surface and, as the oil comes up, the valves are adjusted and the well becomes a producer.

However, there are times when wells come in prematurely, without the need of explosives and before the tools are out of the shaft or the valves installed. It is not unusual for drilling tools, weighing tons, to be blown through the top of a 120-foot derrick by the gas, which often reaches a pressure of 3,000 pounds to the square inch.

This, of course, means the well is out of control, and there is always the threat of fire which may instantly reach a temperature of from 300 to 3,000 degrees Fahrenheit, burning the derrick like a paper bag in a furnace and reducing the steel and iron equipment to a glowing mass of metal.

Oil well fires can be caused in a number of

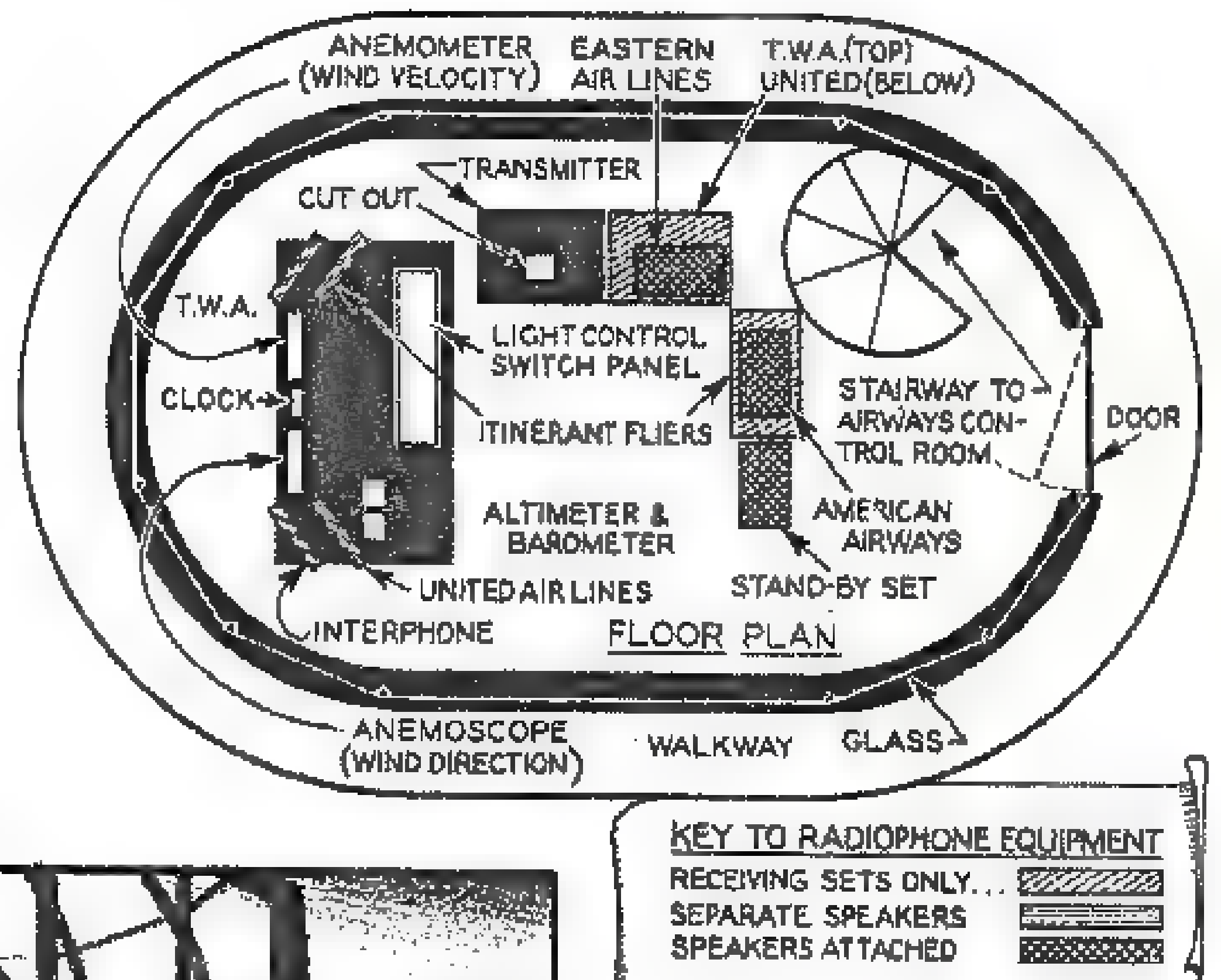
[*Continued on page* 118]

This oil well fire in Roumania blazed for 18 months, killing nine men and injuring scores. Myron Kinley, answering the longest fire run on record—7,000 miles—finally put it out after the King cut red tape, gave him a free hand against the superstitious natives and dubious, busybody officials.

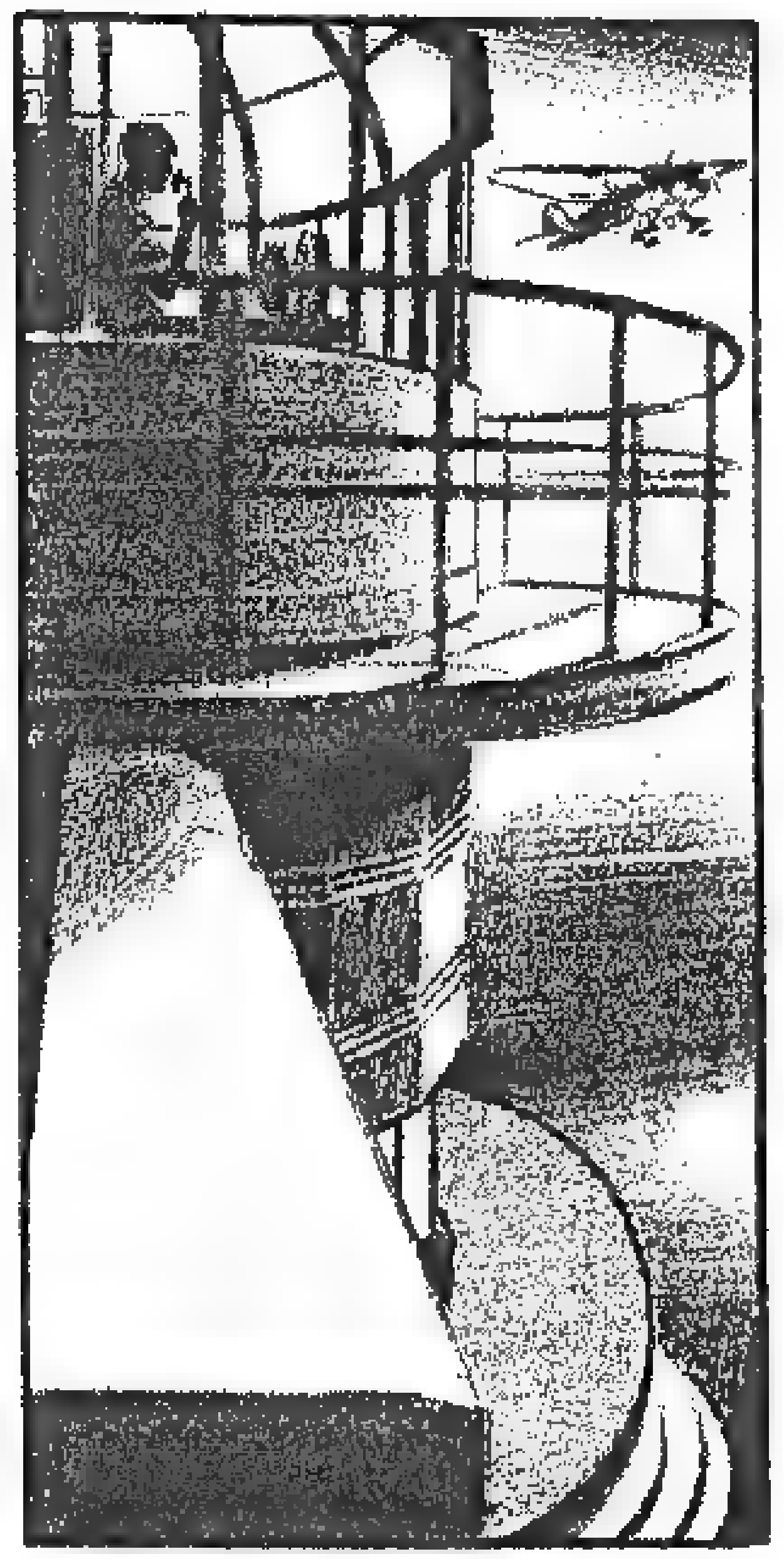
"Hello, Newark—"

"All clear? Can I land?" Hundreds of times daily the Newark Airport Controller must answer these radiophone questions from pilots.

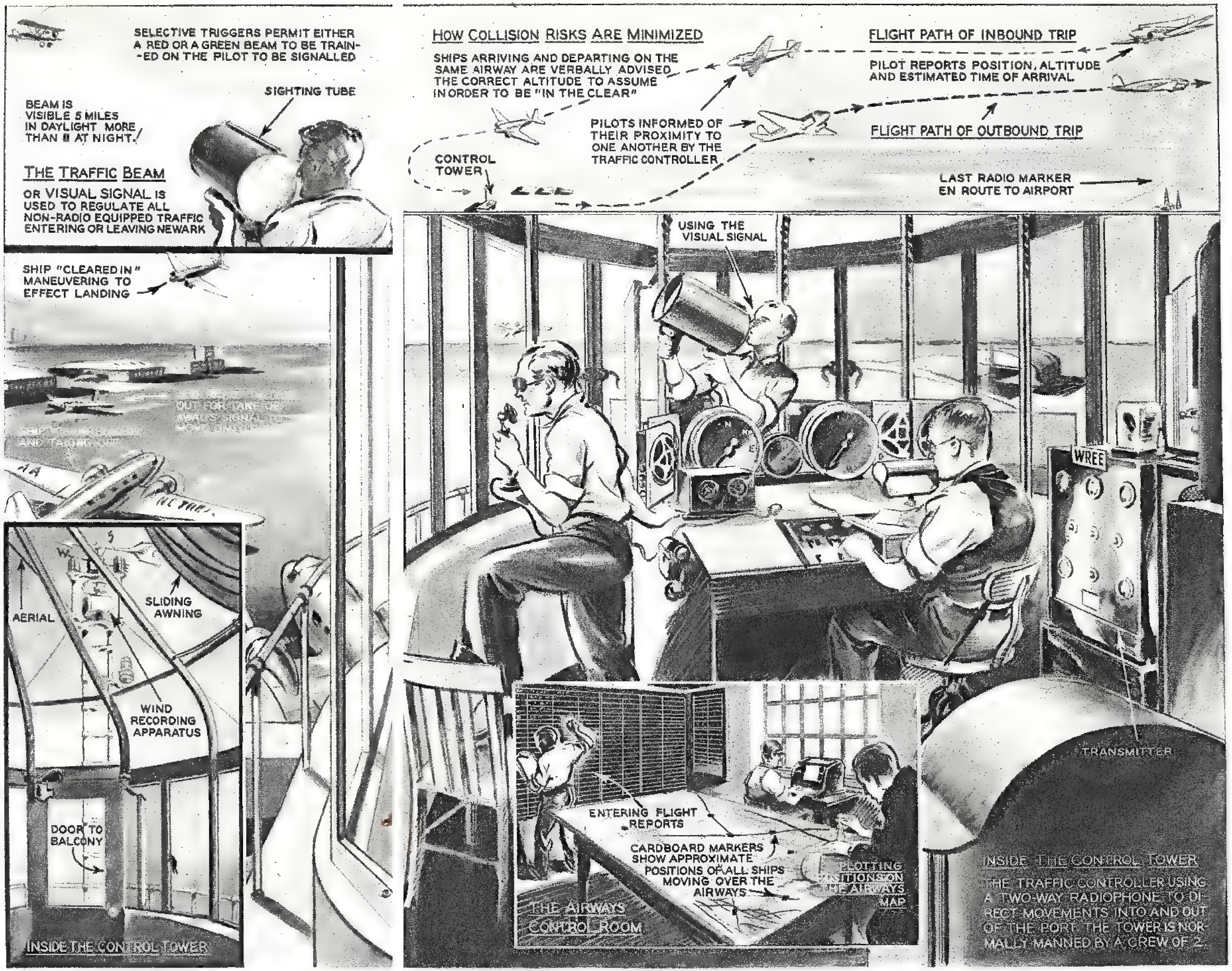
by Douglas Rolfe


ANEMOMETER (WIND VELOCITY)
EASTERN AIR LINES
T.W.A.(TOP) UNITED(BELOW)
TRANSMITTER
CUT OUT
T.W.A.
CLOCK
LIGHT CONTROL SWITCH PANEL
ITINERANT FLIERS
STAIRWAY TO AIRWAYS CONTROL ROOM
DOOR
ALTIMETER & BAROMETER
AMERICAN AIRWAYS
UNITED AIR LINES
STAND-BY SET
INTERPHONE
FLOOR PLAN
ANEMOSCOPE (WIND DIRECTION)
WALKWAY
GLASS
KEY TO RADIOPHONE EQUIPMENT
RECEIVING SETS ONLY...
SEPARATE SPEAKERS
SPEAKERS ATTACHED

Above—Floor plan of Traffic Control Tower showing layout of the equipment. Left—From the tower, the Traffic Controller has an unobstructed view of the sky and field. He contacts all planes.



The base of the Traffic Control Tower forms the Airways Control Room. Charts showing position of planes en route are plotted every 15 minutes.


SELECTIVE TRIGGERS PERMIT EITHER A RED OR A GREEN BEAM TO BE TRAIN-ED ON THE PILOT TO BE SIGNALLED
SIGHTING TUBE
BEAM IS VISIBLE 5 MILES IN DAYLIGHT MORE THAN 8 AT NIGHT.
THE TRAFFIC BEAM
OR VISUAL SIGNAL IS USED TO REGULATE ALL NON-RADIO EQUIPPED TRAFFIC ENTERING OR LEAVING NEWARK
HOW COLLISION RISKS ARE MINIMIZED
SHIPS ARRIVING AND DEPARTING ON THE SAME AIRWAY ARE VERBALLY ADVISED THE CORRECT ALTITUDE TO ASSUME IN ORDER TO BE "IN THE CLEAR"
FLIGHT PATH OF INBOUND TRIP
PILOT REPORTS POSITION, ALTITUDE AND ESTIMATED TIME OF ARRIVAL
PILOTS INFORMED OF THEIR PROXIMITY TO ONE ANOTHER BY THE TRAFFIC CONTROLLER
FLIGHT PATH OF OUTBOUND TRIP
CONTROL TOWER
LAST RADIO MARKER EN ROUTE TO AIRPORT
USING THE VISUAL SIGNAL
SHIP "CLEARED IN" MANEUVERING TO EFFECT LANDING
AA
NC
AERIAL
SLIDING AWNING
WIND RECORDING APPARATUS
DOOR TO BALCONY
INSIDE THE CONTROL TOWER
WREE
TRANSMITTER
ENTERING FLIGHT REPORTS
CARDBOARD MARKERS SHOW APPROXIMATE POSITIONS OF ALL SHIPS MOVING OVER THE AIRWAYS
PLOTTING POSITIONS ON THE AIRWAYS MAP
THE AIRWAYS CONTROL ROOM
INSIDE THE CONTROL TOWER
THE TRAFFIC CONTROLLER USING A TWO-WAY RADIOPHONE TO DIRECT MOVEMENTS INTO AND OUT OF THE PORT. THE TOWER IS NORMALLY MANNED BY A CREW OF 2.

The Traffic Controller at Newark Airport uses radiophone and light beams to direct air traffic. Planes are advised when to land or take off. Pilots without radio equipment are advised by red or green light beams directed at plane.

NEWARK AIRPORT—busiest air terminal in the United States, if not the entire world—is equipped with every device known to science for the efficient control of air traffic. The huge air liners of the United, TWA, American Airways, and Eastern Air Lines are enabled to arrive and depart with a maximum of safety and minimum loss of time. Itinerant private and commercial planes are also efficiently controlled at this most modern airport.

A small glass enclosure atop the Administration Building houses the Traffic Controller and his assistant who have an unobstructed view of the field and sky in every direction. Two men are on duty night and day. An Airways Control Room is located in the base of the Traffic Controller's tower. Here, the radiophone reports from planes en route are received and charts showing the approximate position, speed, and altitude of every plane in transit are plotted at 15 minute intervals.

Incoming planes radio their approach to the field and the Traffic Controller, informed by the "AC" room as to the nearness of other approaching planes, radios back directions as to what altitude to approach the field at, weather conditions, direction of wind, etc. Approaching the field at the specified altitude, the pilot soon receives a message that the field is "clear" and a landing can be made. Outgoing planes are informed as to when they can take off and what altitude must be reached before a turn onto the desired course is permissible. Collision danger is eliminated.

ROMANCE Of The TIN CAN

Miles of thin steel sheets being rolled out to be tin-plated and turned into "tin cans" destined to supply the tables of the nation with everything from soup and fish to beer.

What makes the "tin can" tin—tinning machines plating sheets of steel to supply the big canning industries.

by Nelson H. Budd

Napoleon, defeated by Nature—his armies starved on retreat from Moscow, first dreamed of victories by preserving food to feed his men. Had canned rations been available he might have conquered world.

CUT all the tin plate used annually to make the tin cans of America into a strip one foot wide and you can wind that strip around the earth fourteen times.

Or, to visualize it another way, take the five billion odd square feet of tin plate into which we put our fruits, vegetables, meat, fish, beer, paint, oil, candy, cheese and tobacco each year and it would be a simple matter to *can the moon.* You'd have the biggest cheese can ever made, and still have a lot of tin plate left over.

The vastness of tin can production has brought this familiar article into the lives of nearly every American family, for it is in this country that the greatest volume of tin cans is produced. A good year will find between eight and nine billion cans for the food racks of this country and this is the business that accounts for the major percentage of cans.

A can of beer these days is a far cry from that long dead era when "rushing the growler" was something pretty vulgar. This is a summer scene on New York's swank Fifth Ave.

Yet, what we call a tin can is not a tin can at all. The lowly tin can—nemesis of the alley cat, object of fun and ridicule—is made of a thin strip of steel, with a film of tin on its outer surface. The tin can is slightly more than 98% steel; slightly less than 2% tin.

In America we refer to the "can" or the "tin can" and to "canned goods" or "canned foods"; in England the term is the "tin" or "tinned foods." But "tin can" is decidedly a misnomer. We might as reasonably call our bathtubs "enamels."

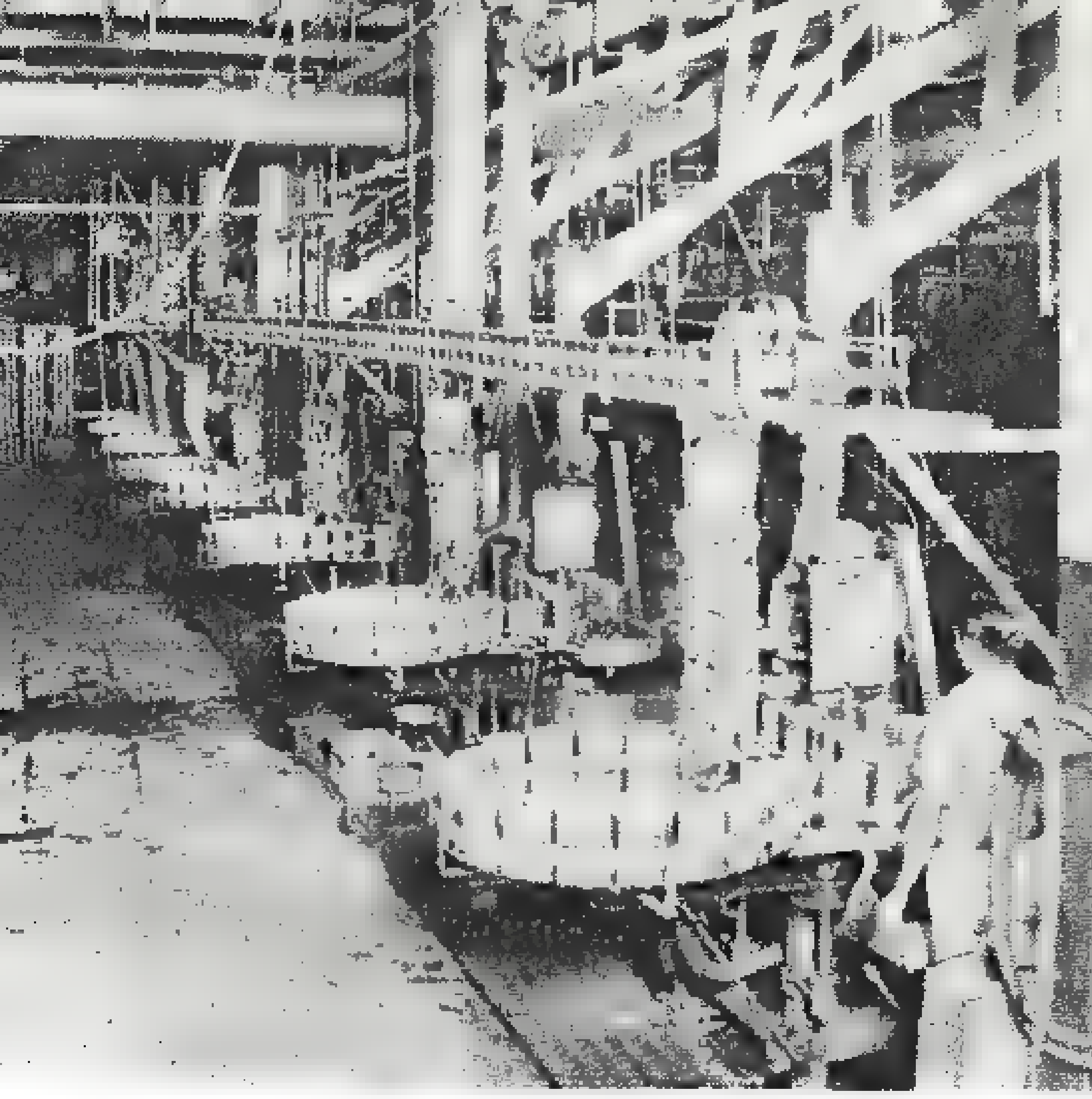
This is how it came about. Back in the early eighteen hundreds metal food containers were being developed—the ancestors of today's tin can. They were known as tin canisters. Copies of the yellowed order books of the salesmen show that they almost always abbreviated their notes, as "tin cans." or "cans." And thus the word got into the vernacular to stay.

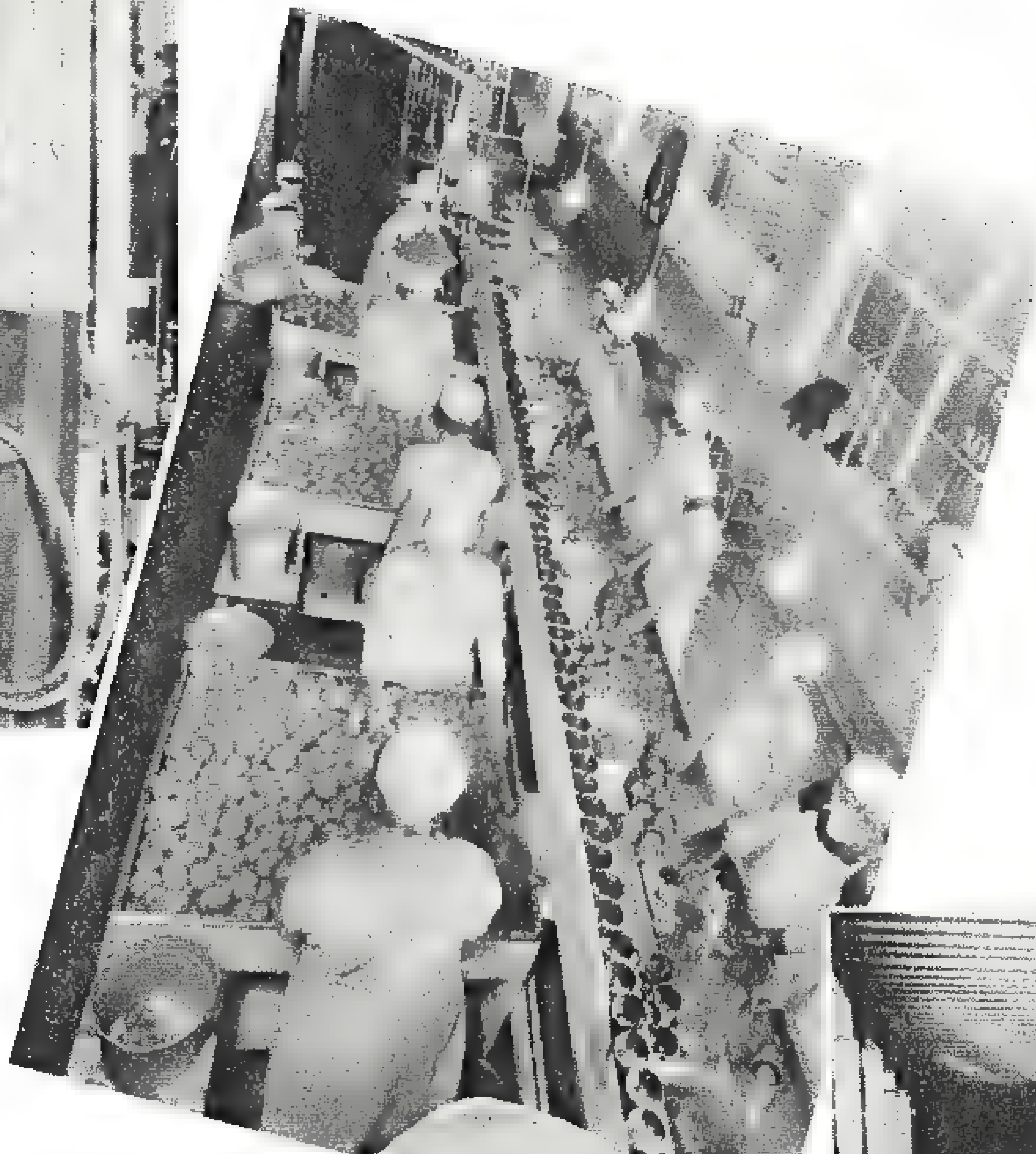
An antique can of corn, the granddaddy of today's streamlined can (right). This relic of the present industry was handmade in a Maine cannery.

Every now and then a new canned product seizes public acceptance and shoots the manufacture of cans up into the millions. Within the past two years beer in cans has swept the country. Since this has occurred, the consumption of packaged beer, which formerly stood at 25% of the total output, has risen to 35%.

The phenomenal success of beer in cans has led vineyardists to the conclusion that wine also can become a profitable and popular tinned product.

Nine wineries, alarmed at the present exorbitant prices of their product in highly-





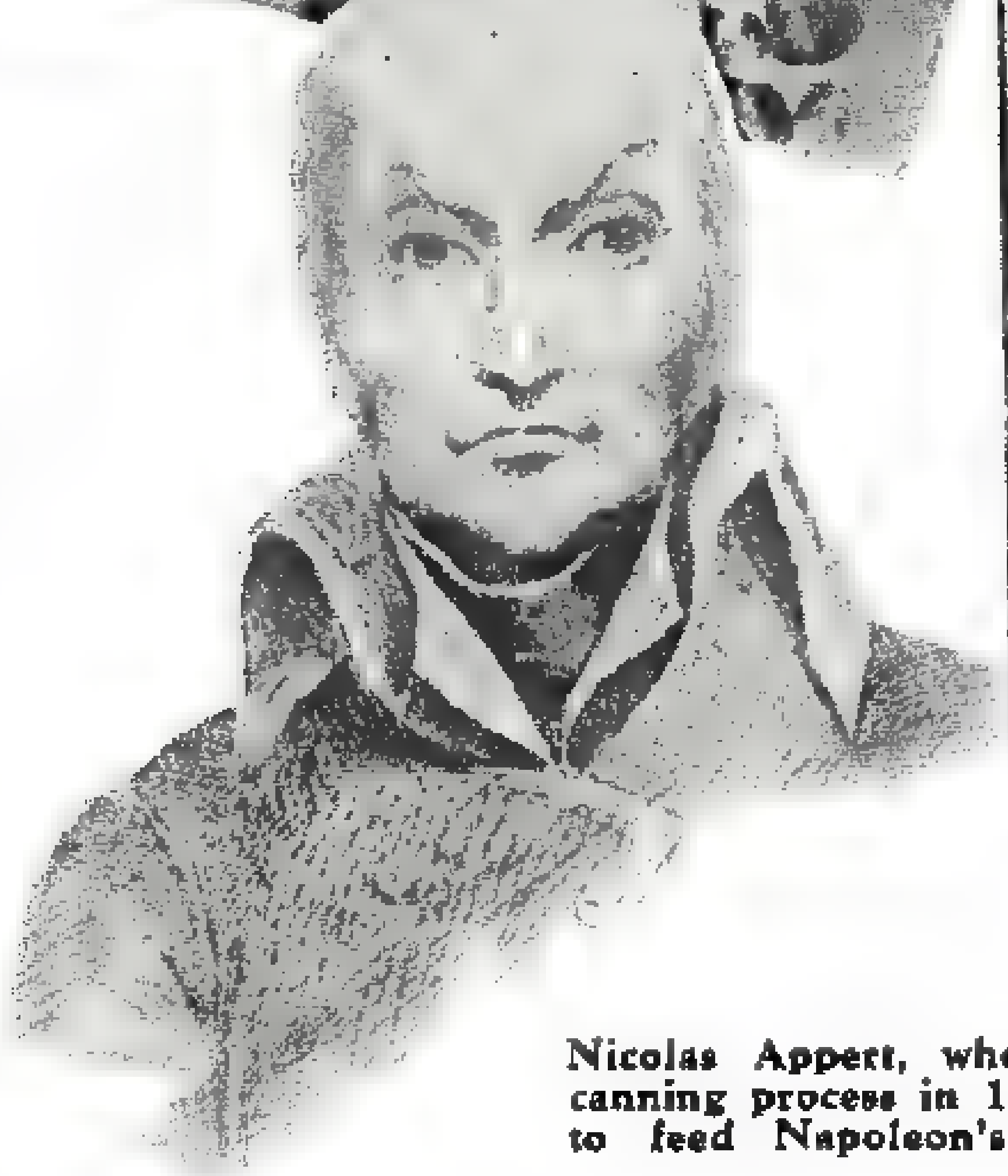
Conveyer belt carrying empty cans to the production line in Hawaiian Pineapple Company, Ltd., cannery. At right, tomato inspection line in Kemp Brothers' Packing Company in Maryland.

taxed liquor stores, which have tended to swing purchases in favor or beer and hard liquor, plan to encourage consumption of domestic wine by offering it inexpensively in cans in grocery stores as an adjunct to the home menus.

The entire history of the tin can is dotted with revolutionary occurrences of this nature. In fact, the chronology of can making is completely tied up with the history of canning. The two are inter-dependent, like the chicken and the egg. Which came first, manufacture of canned foods or manufacture of containers to hold them? As a matter of fact, the two have grown to man's estate, in perfect pace. Each has contributed to the other's growth. An improved canning process might bring a new food into the market, thus creating demand for millions more cans. Or an improvement in actual can manufacture would in turn make possible new production volume in canned foods. The phenomenal growth of the manufacture of tin cans has been caused by the increase in canned foods consumption, and it works both ways. No history of the tin can is possible without bringing in alongside it, the history of the art of canning.

The tin can is chiefly important because it makes possible what the inventor of the method of food preserving set out to accomplish 140 years ago—a way to cook food and to contain it, so that it would be edible for long periods of time.

The method of preserving food originated in France; the method of manufacturing the tin can, in England; but the development, both of food preservation and can construction to today's remarkable status, is American.



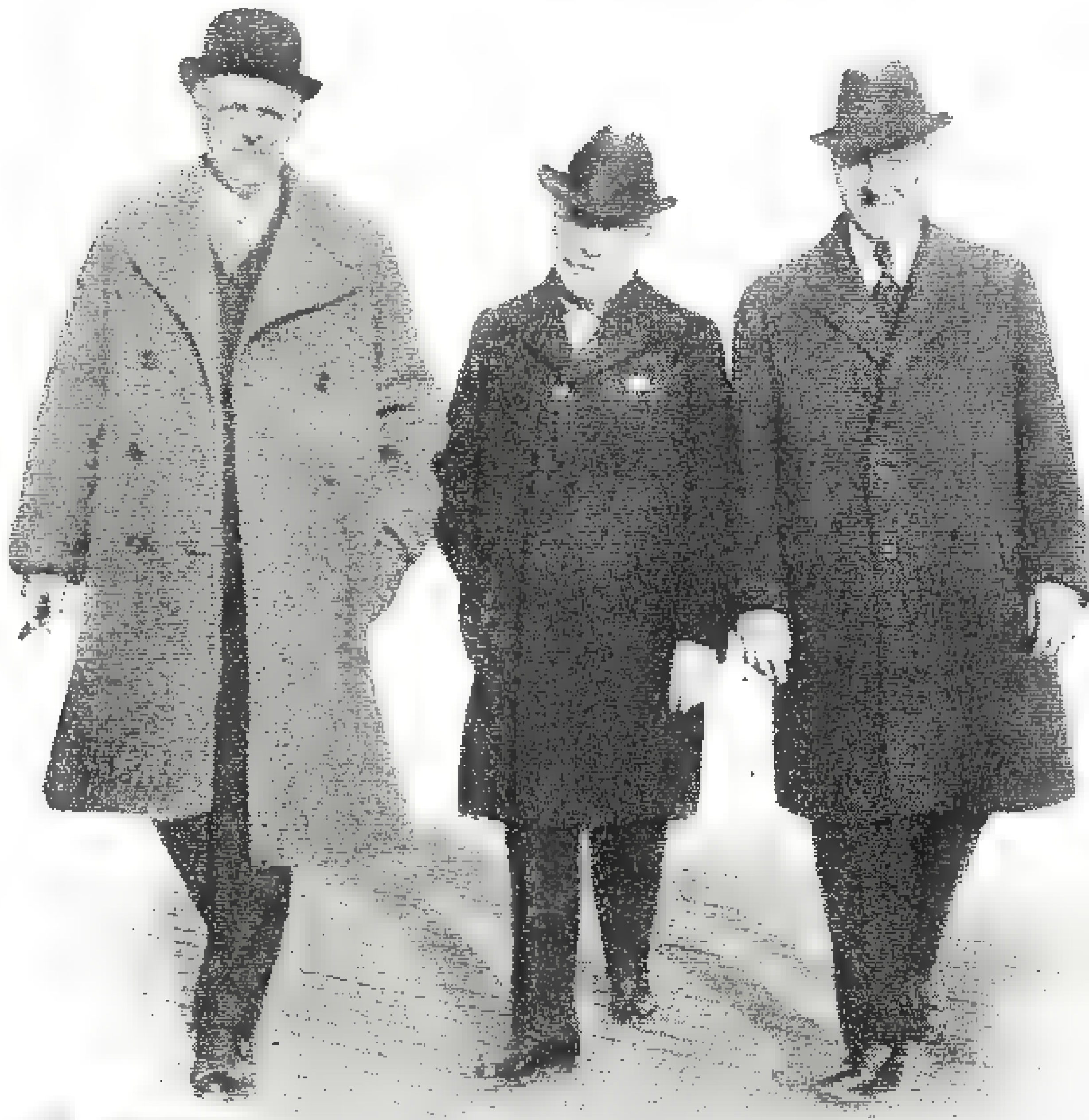
Nicolas Appert, who invented the canning process in 1809, in a hope to feed Napoleon's huge armies.

Back in 1795 nearly every nation in Europe was fighting France and she had revolution at home. The Government needed some method of feeding its armies abroad and its sailors at sea. Scurvy ravaged the sailors; foraging was not always feasible in the Napoleonic campaigns. A prize was offered to the Frenchman who would solve the problem. It was won by Nicolas Appert in 1809, though he'd been working on it long before the prize was offered.

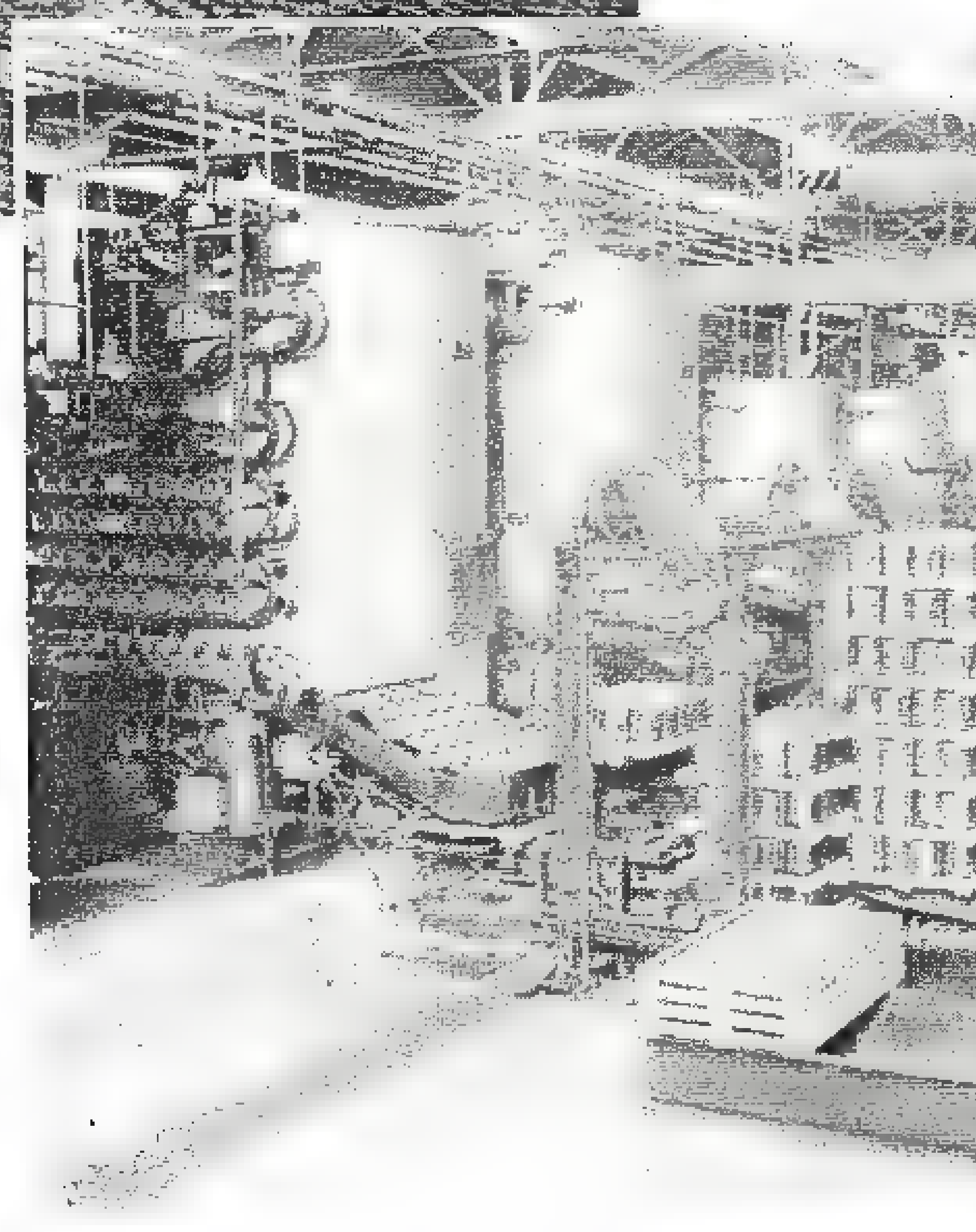
He was the Father of Canning and therefore, the Father of the Tin Can, although his first experiments were performed with glass jars and bottles, closed with corks. Appert's theory, worked out long before Pasteur, is the theory still followed by commercial canners today. He sterilized the food by heat and he sealed the container hermetically. Though his apparatus was crude and awkward, he was painstaking and thorough, and he perfected a theory, and put it to the test that has proved one of the greatest benefactions to mankind's comfort and health.

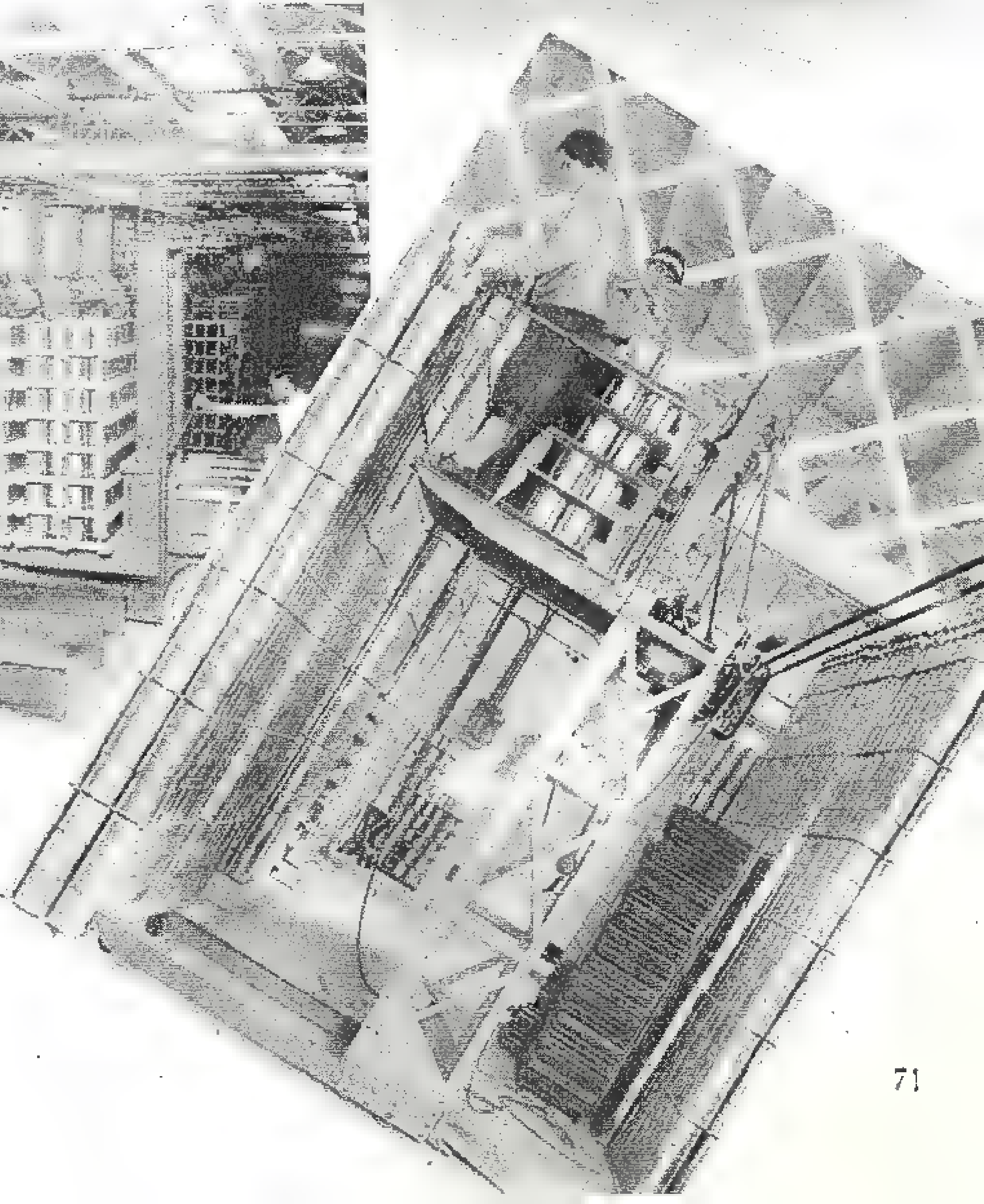
In the fourth edition of Appert's treatise on his new method of preserving foods he mentions the use of canisters. But the French were poor artisans in tin and Appert had to make them in his own factory. He had tin plate of poor quality and numerous other difficulties, and though he applied his best resources to the problem, Appert's real contribution was the all important method of processing foods, rather than the invention or development of the container.

While Appert was thus engaged, an Englishman named Peter Durand obtained a patent in 1810 for a tin plate canister. Now we see the first tin can emerging out of history. It was cylindrical, like the one we see coloring our grocery and pantry shelves today, but was made entirely by hand. The

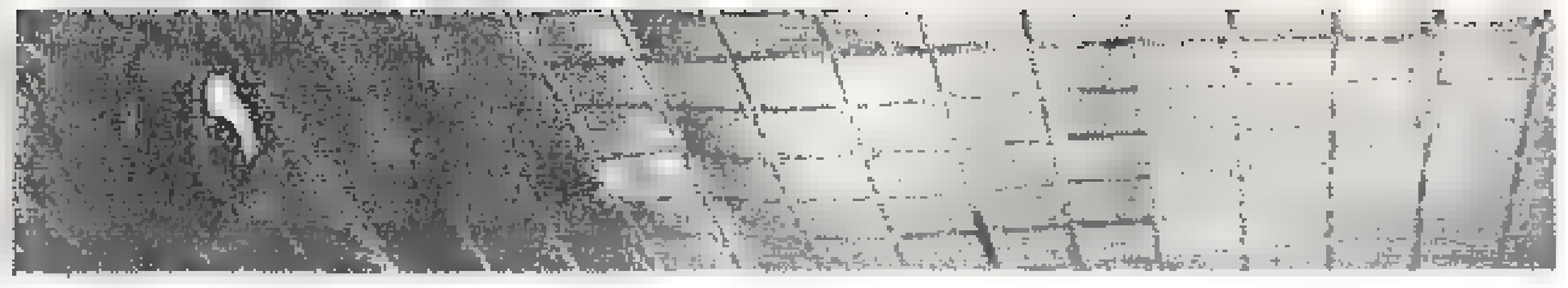


These three, snapped as they strolled the board walk in Atlantic City in 1923, are the men who put over the modern can. Left to right, George Cobb, Sr., the late Charles Ams and the late William Y. Bogle.





Racks of cans cooling after cooking (center of page). Workman of Hawaiian Pineapple Company, Ltd., conveying the filled cans to the storeroom, while photo at right is typical scene in storage where cans await fancy labels.



SERVICING 200 TRAINS DAILY AT SUNNYSIDE

Long Island Plant of Pennsylvania, Greatest Passenger Yard in World, Achieves Hourly Miracles Oiling, Cleaning, Refrigerating, Repairing Its Array of Streamlined Marvels.

by Brian Hayward

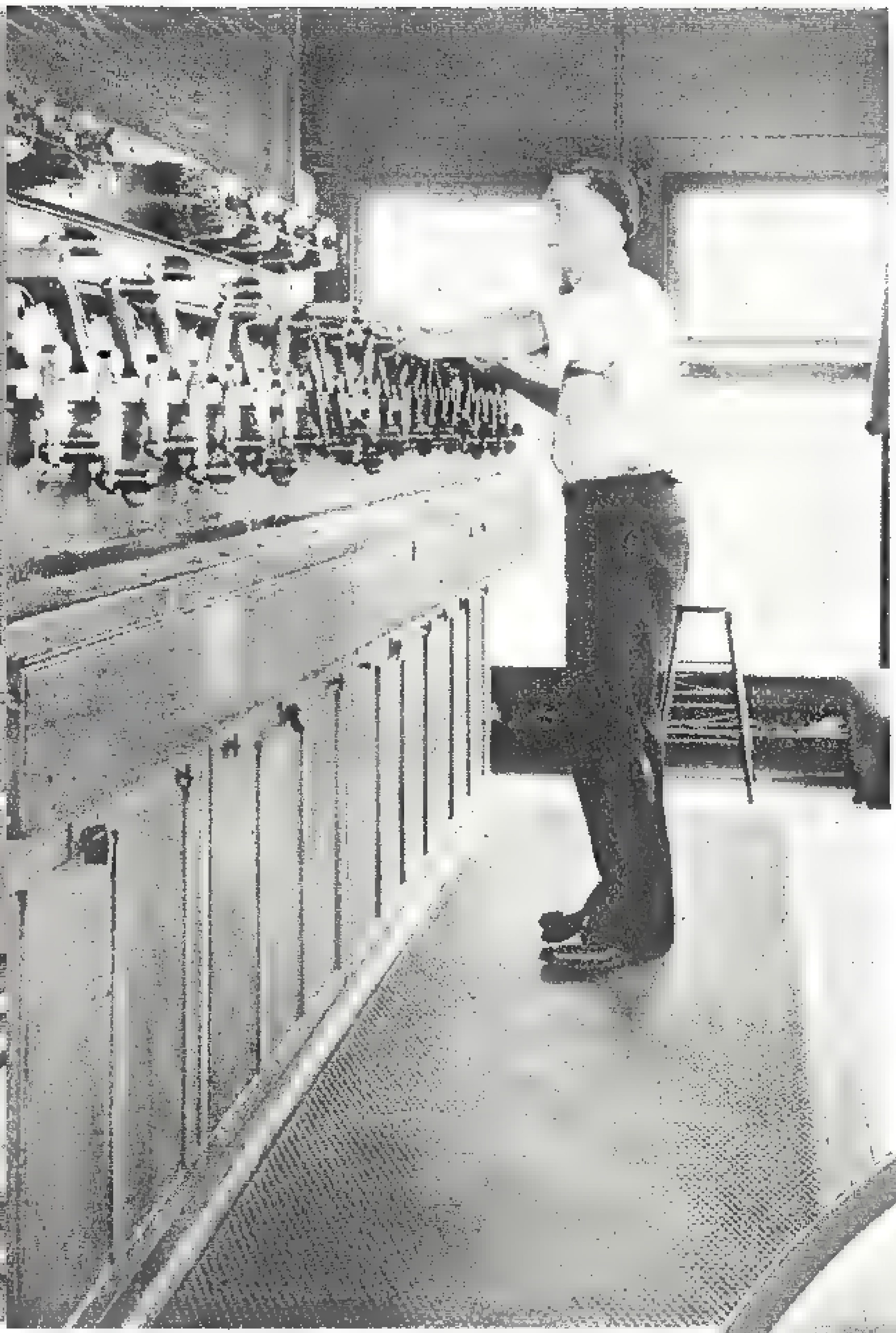
WHAT happens to the train when you leave it at the terminal? In earlier days it wasn't necessary to ask such a question. A clanking old switcher hooked on to the line of cars and yanked them out into the adjacent yard in full view, there to reach bake oven temperature in the summer sun or to become traveling refrigerators in winter. The terminal was then literally the end of the road and the engine of your train was right at rail's end when it stopped in the depot.

But modern railway terminals are in the center of big cities where land costs for the several hundred acres necessary for a present day railroad yard are prohibitive. Trains have to go elsewhere to the cleaners and the twenty to thirty other trades that service them before they again appear in the terminal headed in the other direction—west or south.

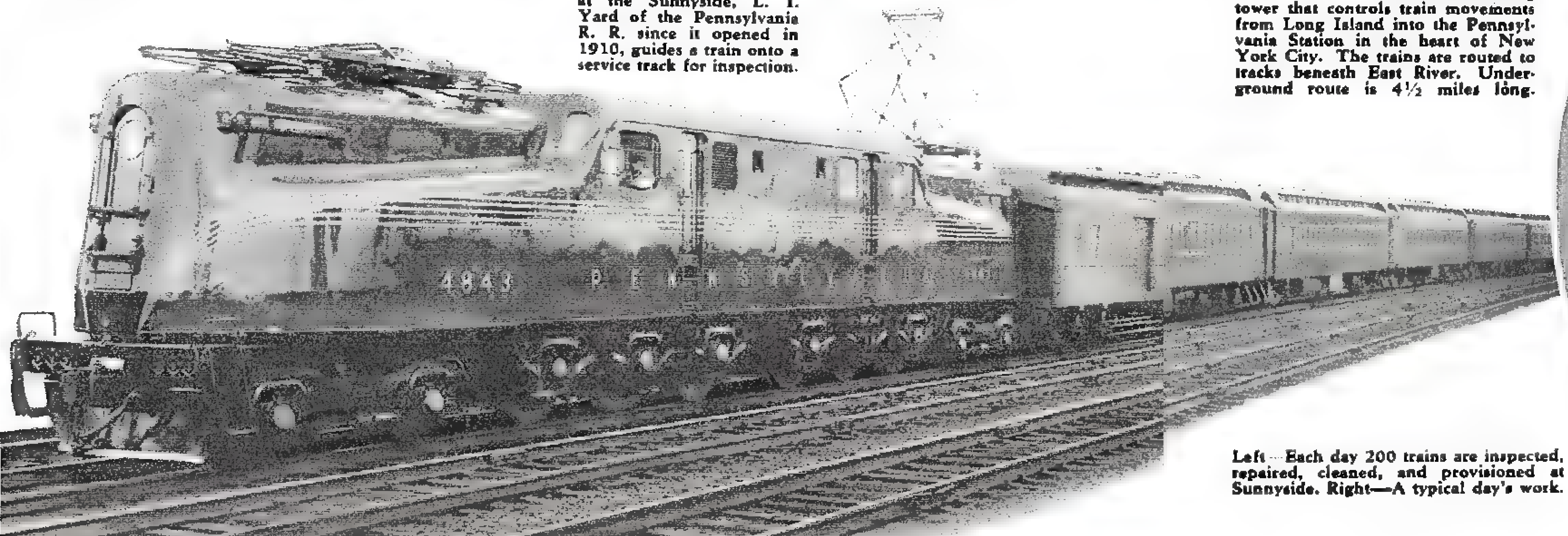
Suppose you have just come in on the Pennsylvania's crack No. 28, the sixteen-and-a-half hour Broadway Limited from Chicago. What becomes of it before it again appears in the Penn Station as No. 29 headed West? Odd numbers are west or southbound—even numbers east or northbound trains. When the engineer of a stalled train whistles his rear end brakeman back aboard, he blows five blasts if west or southbound, four if headed the other way.

In an old terminal the passengers walked the length of the platform, passed the big steamer with its compressor chugging as if the engine were actually panting. Instead of departing horizontally on the same level as the train, he now leaves by the nearest stairway and comes out into daylight two flights above. The 4,600 h.p. streamlined electric that picked up his flyer at Paoli is so far up ahead in the recesses of the great underground station that he never sees it. But as soon as he

Above—J. D. Maple, Yard Passenger Conductor at the Sunnyside, L. I. Yard of the Pennsylvania R. R. since it opened in 1910, guides a train onto a service track for inspection.



Above—"H" Tower, Sunnyside Yard. This is the interlocking tower that controls train movements from Long Island into the Pennsylvania Station in the heart of New York City. The trains are routed to tracks beneath East River. Underground route is 4½ miles long.



Left—Each day 200 trains are inspected, repaired, cleaned, and provisioned at Sunnyside. Right—A typical day's work.

Supplies to provision hundreds of dining cars are kept in a commissary at Sunnyside. Trucks carry supplies to waiting trains. Pennsylvania R. R. diners feed 10,000 travelers daily.

and the rest of them have departed, it continues its eastbound trip through a 100 million dollar system of under river tunnels for another 4½ miles until it rounds the loop and stops on one of the 75 tracks of Sunnyside—the world's largest railroad passenger yard.

Sunnyside is a pretty sizable community in itself—one of those self-contained organizations where everybody works—whose activities go on apace 24 hours a day every day in the year. It is but one of the many important features of railroad service that the passenger never sees but one so essential to modern railroading that a breakdown here would mean the disruption of operations to a great extent on some 700 miles of main line, chiefly between New York, Washington, Harrisburg and Pittsburgh. It handles an average of 200 trains a day, or a little better than four in and out every hour, the day's peak being reached between 3 and 8 p. m., when five to six arrive and depart each hour. With the exception of the hourly Philadelphia expresses during business hours, these are chiefly heavy limited trains, most of them with club, diner, observation and baggage or mail cars in addition to their lines of ten to twelve or more sleepers. In addition to its daily peak, the yard has week-end and holiday peaks.

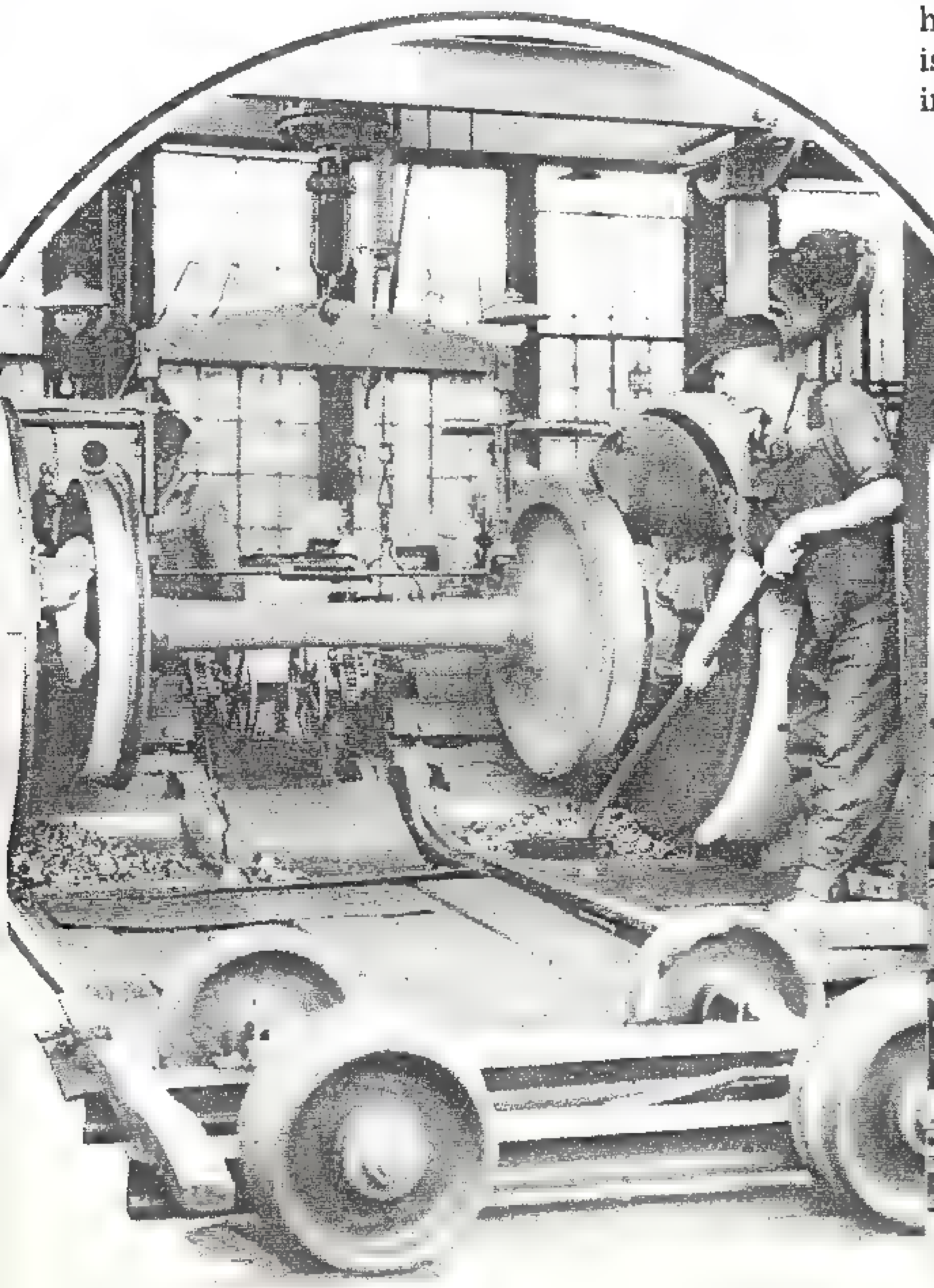
When No. 28 reaches Sunnyside the 640,000-pound streamlined electric that hauled it at a ninety-mile clip on its last lap, is uncoupled and goes to the engine house for inspection, oiling and any adjustments or repairs that may be necessary. Next it goes to the bunkering station to take on fuel and water just as the steamer does. The electric locomotive heats the train in cold weather from an oil-fired steam boiler, utilizing the standard heating equipment of the cars, as does the steam locomotive when it takes hold. So the next time you see the very latest thing in electric locomotives blowing off steam, don't be alarmed—it hasn't mistaken its ancestry and it doesn't carry a steam-driven plant to supply the juice that runs it—it's just a heating unit rarin' to be hooked on to its line of radiators.

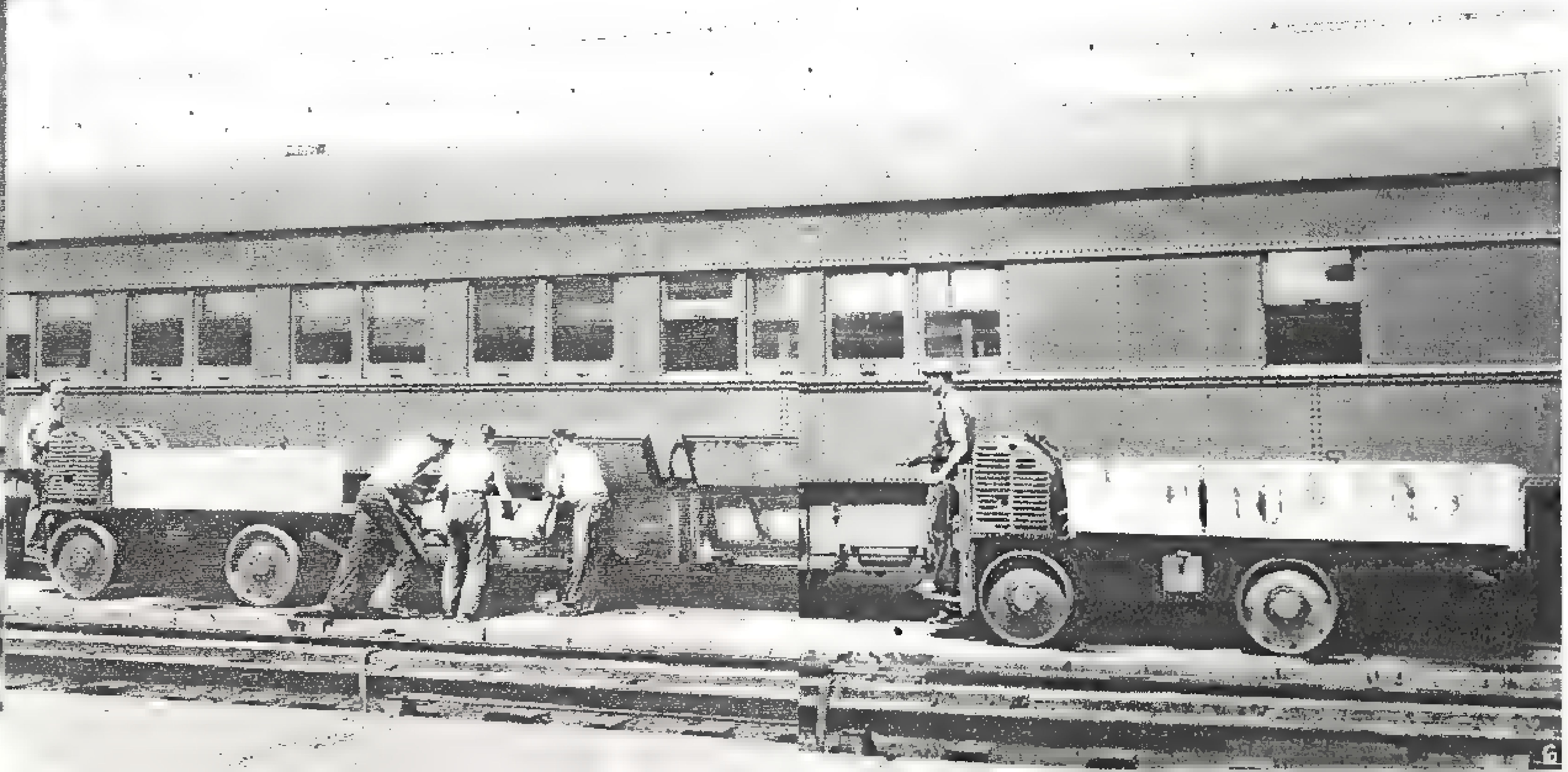
Having been inspected, oiled and watered, the huge, high-speed power unit, almost as long as a modern sleeper, makes its last lap down the yard to be "sanded." More than a ton of fine-screened, baked-dry sand is shot over from the sand house by compressed air through pipe lines into its six sand bunkers and it's all set to go. The westerly switch tower, whose operator weaves the outgoing ends of any combination of the twenty-five to thirty miles of yard tracks into two departing strands at will, shunts it to the head of No. 29, and forty-five minutes in advance of the "all aboard" hour at the Penn Station, it once more dives under the mud and rock of the East River on its way west.

While the locomotive has been undergoing all this servicing what has happened to the train itself? The moment the engine pulls

[*Continued on page* 128]

Above—A car-cleaning crew at work. Cars are cleaned thoroughly inside and out, even to the extent of washing the cars in oxalic acid. Right—J. J. McGann is Yardmaster at Sunnyside Yard, a job involving the solution to many problems that arise. He has a corps of experienced assistants.





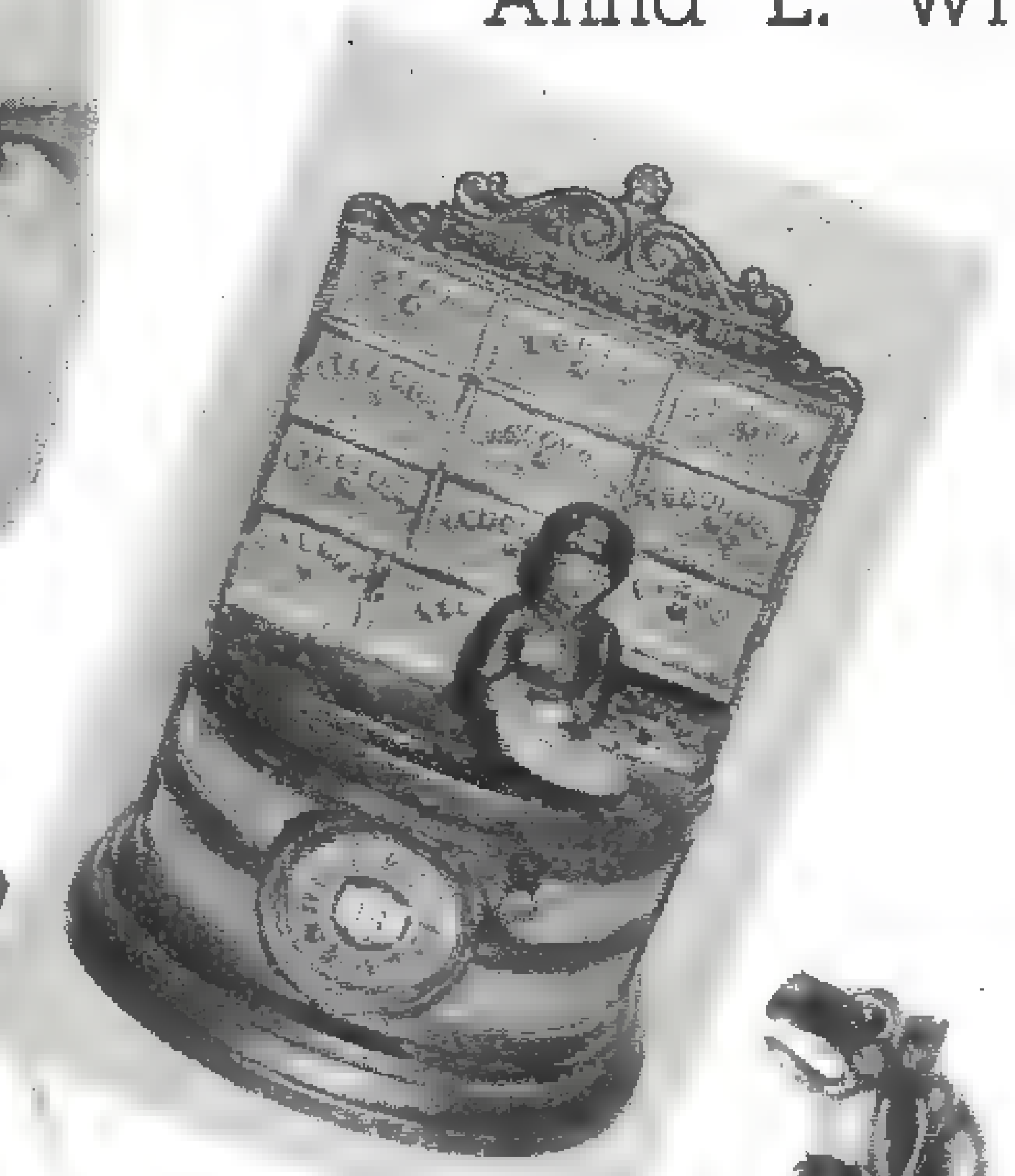
Left—The wheel shop in Sunnyside Yard, showing a wheel turning lathe "turning down" wheels. Car wheels are "shaved" or turned down 3/8" at regular periods to insure smooth riding. Below—Supplying Pullmans with ice for cars that have no power air conditioners.

COLLECTORS VIE for PENNY BANKS

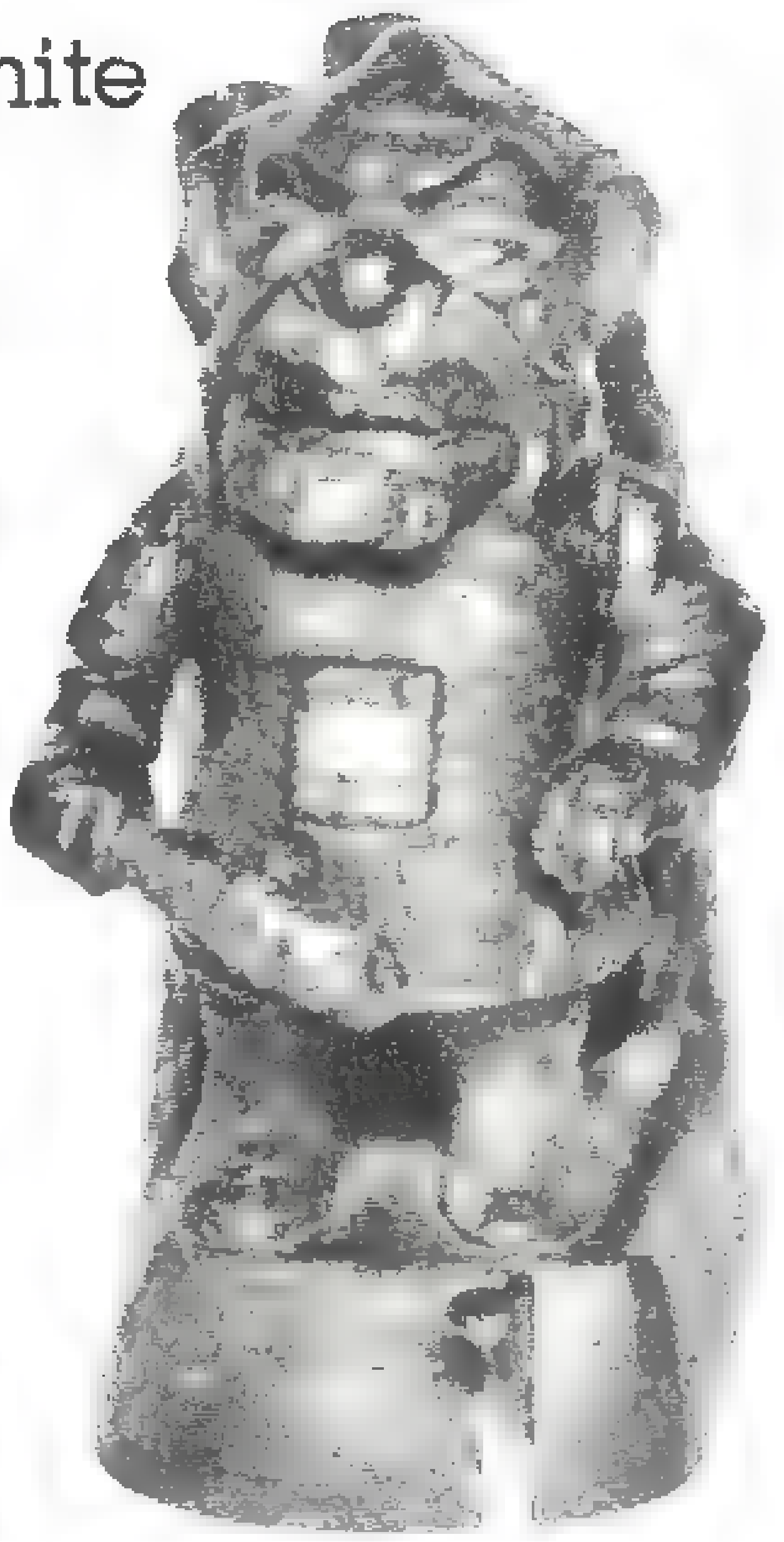
Weird and amusing coin devices of last century are now rated real "Americana" by the connoisseurs.

by
Anna L. White

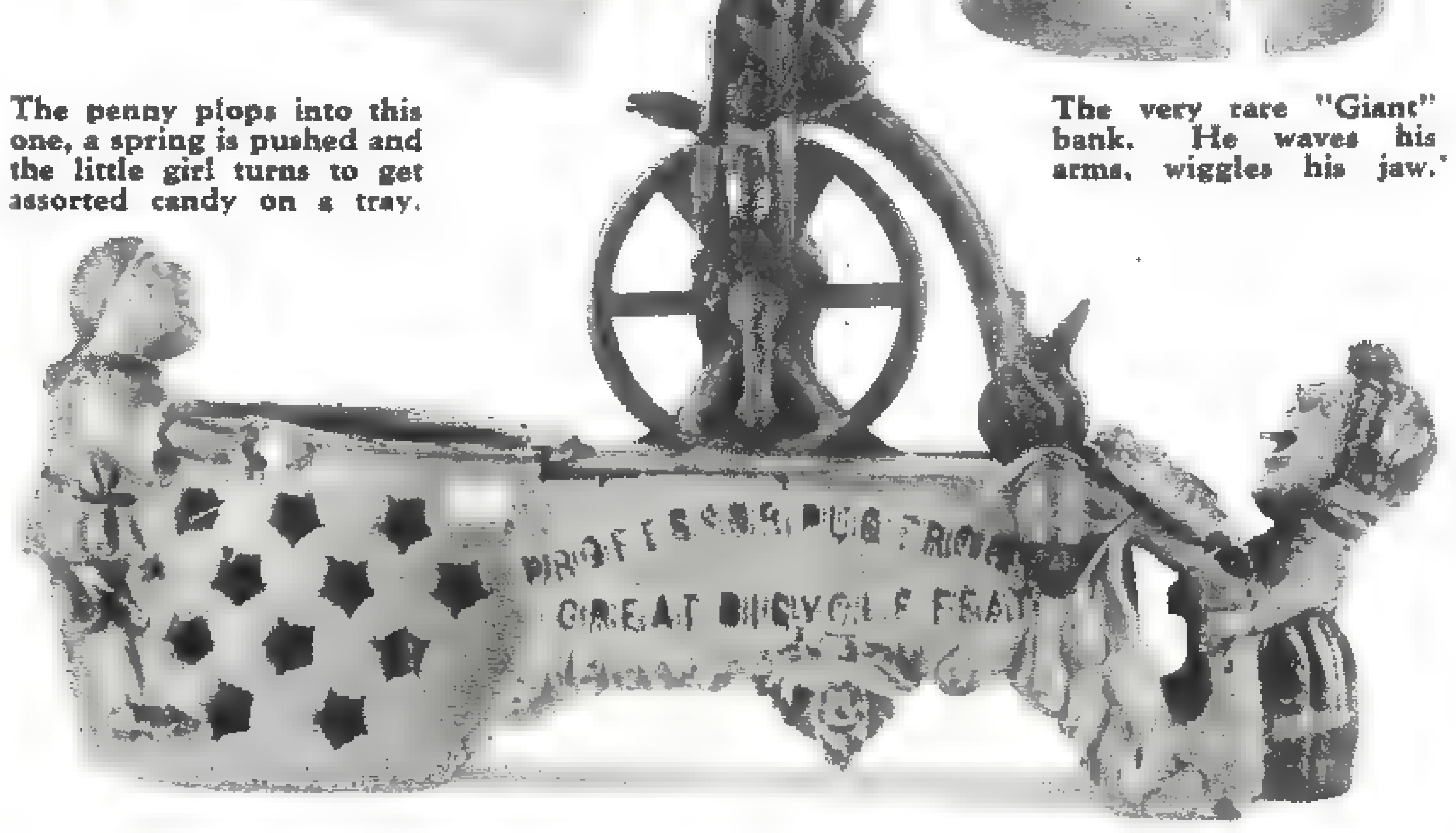
Elmer Rand Jacobs, vice-president of Seamen's Bank for Savings in New York, who is a leading collector of penny banks, now classed as "Americana." Three prizes in his collection are shown in this page.



The penny plops into this one, a spring is pushed and the little girl turns to get assorted candy on a tray.



The very rare "Giant" bank. He waves his arms, wiggles his jaw.



"Professor Pugfrog's Great Bicycle Feat." In this bank the wheel spins and tosses the coin into the basket held by the laughing clown.

JUDGING from the number and variety of small coin banks made during the 1800's we might conclude that saving pennies was the chief indoor sport of the last century. Coin banks were made in tin, iron, brass, wood, leather, glass, pottery, and even silver and pewter, fashioned into all manner of shapes—crude, unique, or beautiful. Now these little banks are classed as "Americana" and are being eagerly sought by collectors.

This fad is of comparatively recent origin, and among the first enthusiasts is Elmer Rand Jacobs, vice president and comptroller of the Seamen's Bank for Savings in New York City.

One of the prizes of Mr. Jacob's collection is the very rare "Giant" bank. This giant moves both arms and jaw. Another is the confectionery store bank, representing boxes of candy on shelves. When a spring is operated a girl turns around and receives candy on a tray. One peculiar bank is a wind-up mechanical device in which a savage dog jumps at a man and seizes the coin which he holds in his hand.

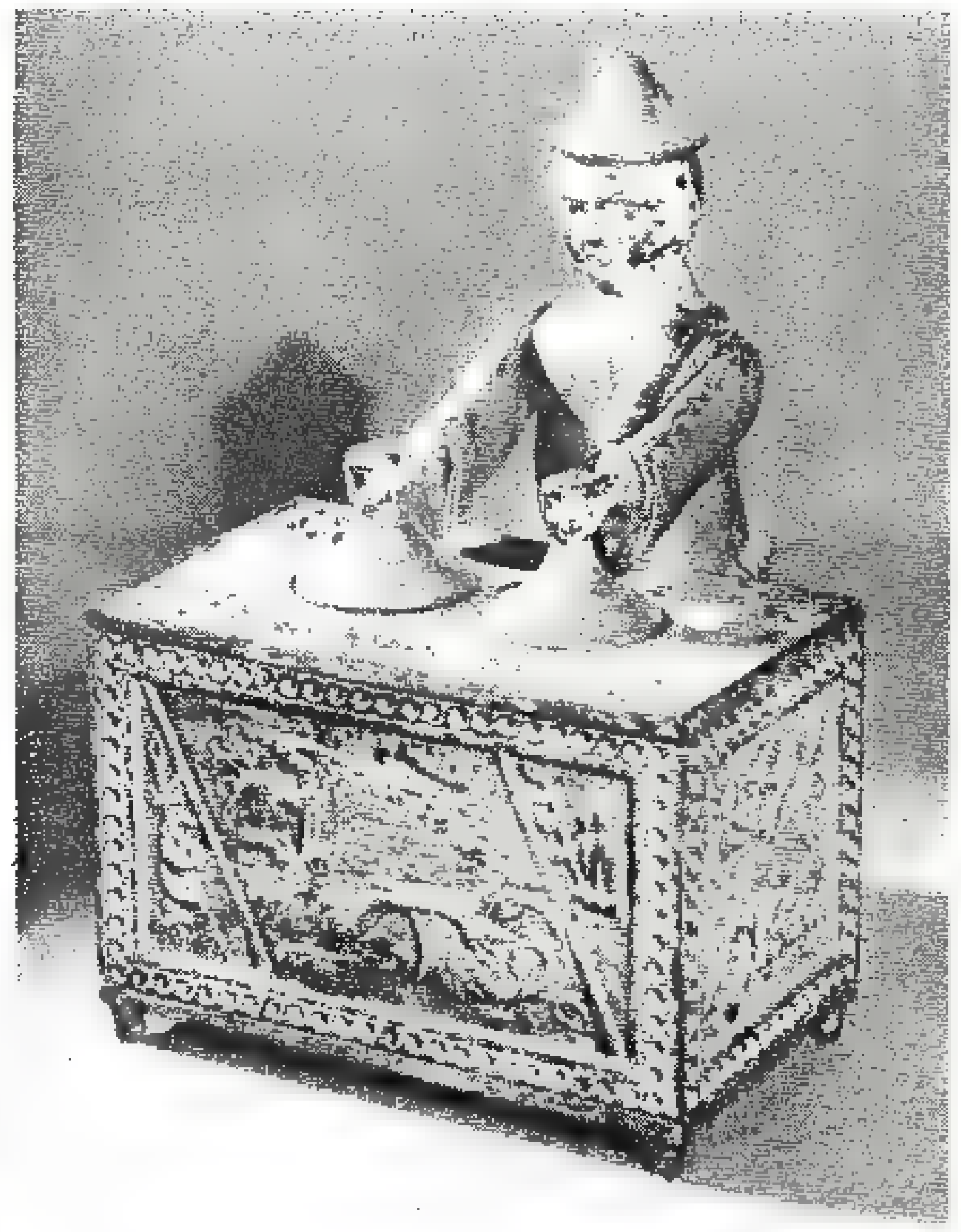
In his travels Mr. Jacobs is always on the lookout for new and unusual specimens. While in Mexico he picked up several banks made in recent years but carefully imitating the old Aztec designs in calendar stone. Another bank is of Spanish origin.

Mr. Jacobs has had printed an illustrated list as a guide to those interested in looking at the collection of juvenile banks on permanent display at the Seamen's Bank, and he maintains that he has made more converts to the hobby than anyone else. Although he disclaims the honor of being the first collector of these banks, he is one of the pioneers.

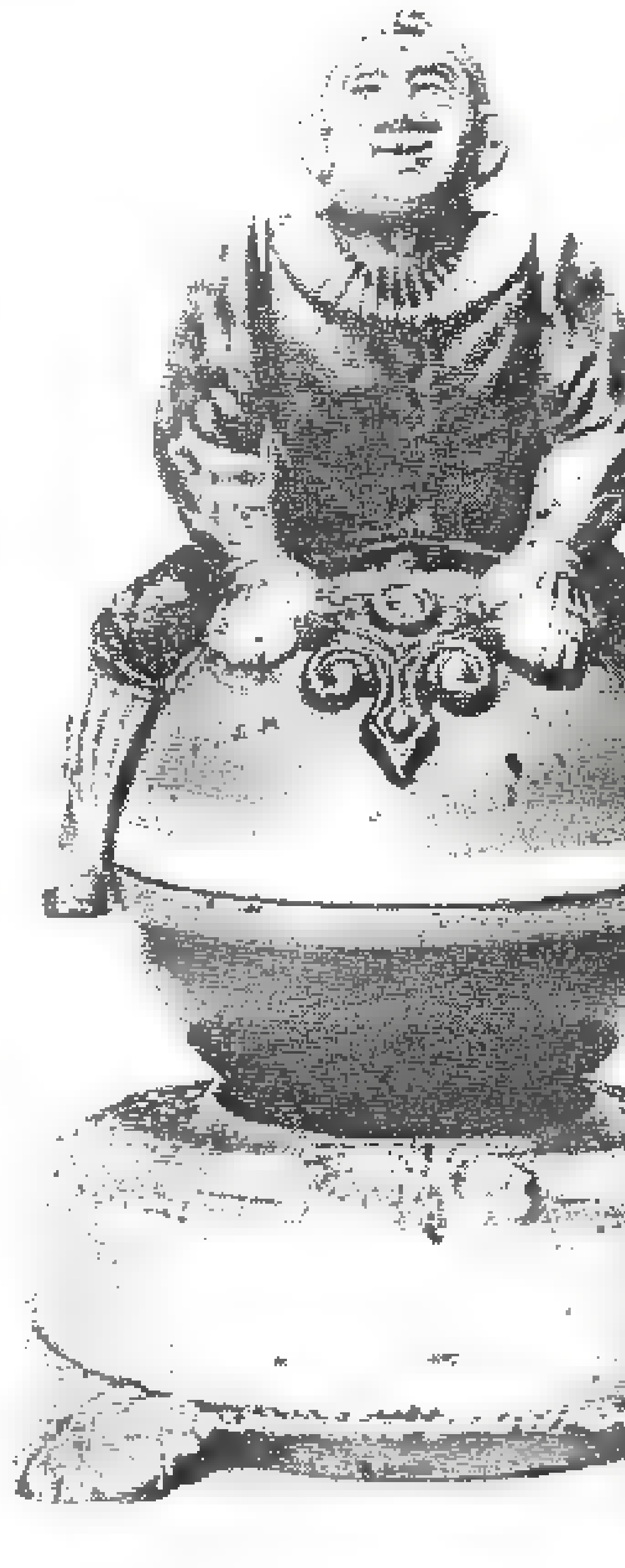
Another pioneer collection is to be found at the Boston Five Cents Savings Bank. This consists of 172 banks, many of them mechanical, some of them rare, which were collected by Wilmot R. Evans, former president of the bank, and which came to the bank through his estate.

The third of the triumvirate of pioneer collectors is Andrew Emerine, of Fostoria, Ohio. Mr. Emerine has a very good collection of both mechanical and non-mechanical banks, among them the "Girl Jumping Rope." In this bank the coin is inserted in a slot, and when a lever is pressed the girl jumps rope, moving head and feet and causing the coin to fall into the bank. Another interesting bank in Mr. Emerine's collection is the "Circus Bank," in which a clown drives a cart and horse around a ring.

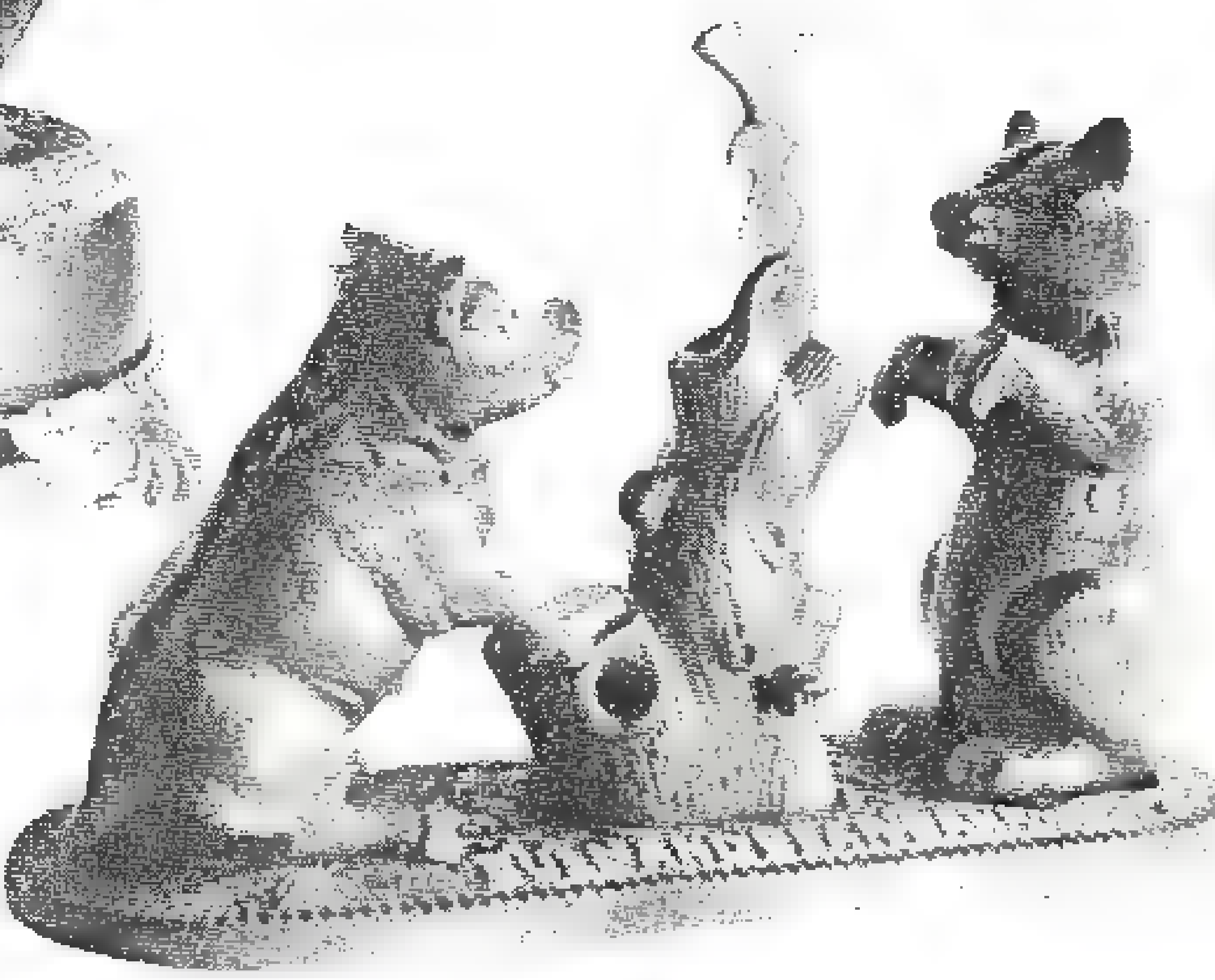
Another Ohio collector is James C. Jones, of Cleveland Heights, who has some interesting and rare mechanical banks. One of these, the "Mikado" bank, was designed to take the

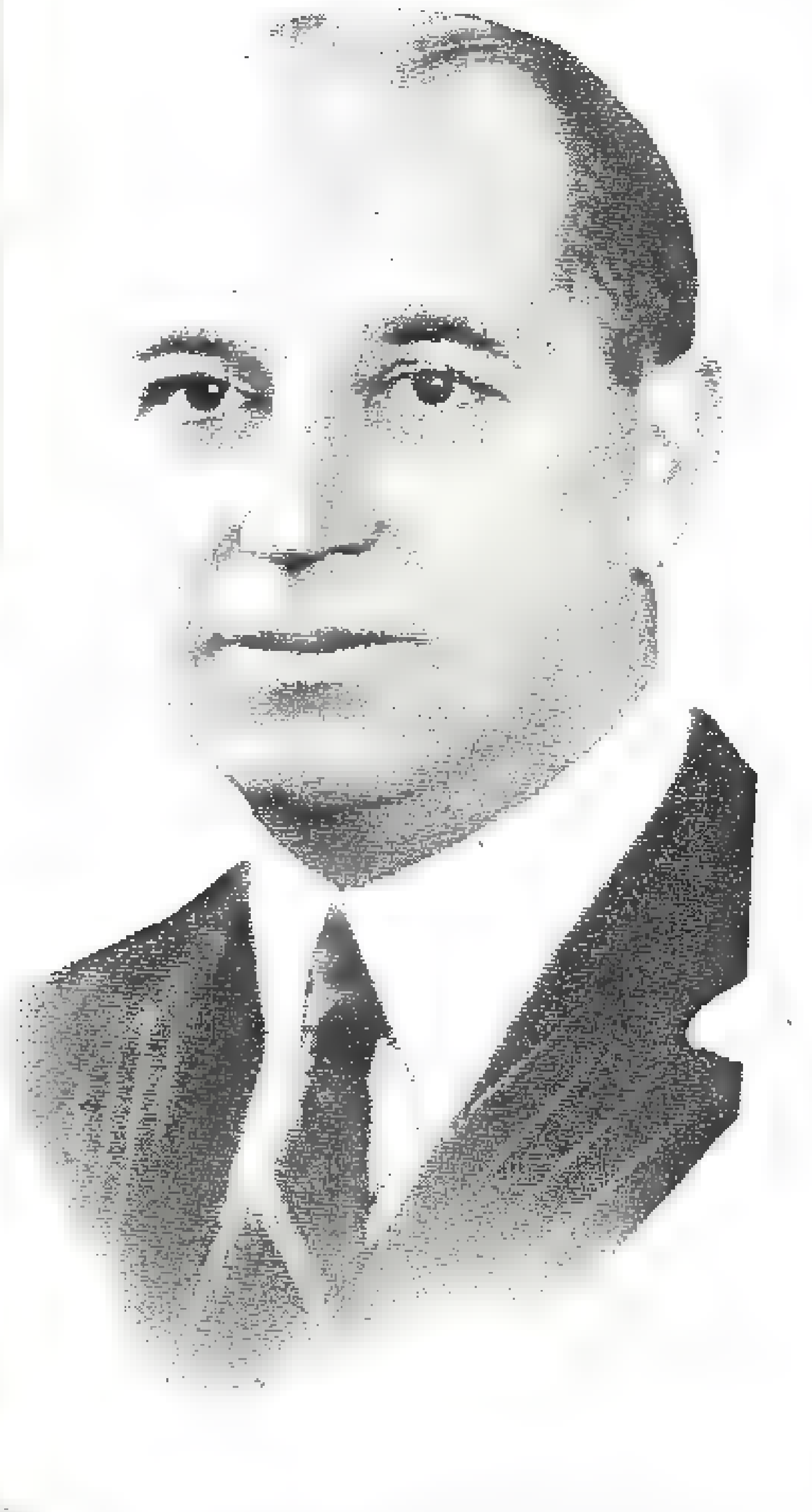


The "Mikado Bank" in collection of James C. Jones of Cleveland Heights, Ohio. The figure hides the penny, like a shell game artist, and makes it vanish.



The clown stands on his head and the globe revolves when penny is put into this rare bank owned by Dr. A. E. Corby, who has one of the largest collections.





Walter P. Chrysler, an avid collector, and his "Bull and Bear" bank, left. When coin drops, the indicator swings to either bull or bear, suggesting which way the market is liable to go.

Fly Fishing From Coast to Coast

by Robert Page Lincoln

Knowing What Kind Of Flies To Use Is Just As Important As Having A Good Rod And Reel. In This Article, Robert Page Lincoln Tells You About Flies That Will Tempt The Finny Tribe.

WHILE to a certain extent there is a great similarity in the manner in which trout take the lures in various parts of the United States and Canada, it is a fact that different sections of the country require different tackle, and, to a certain extent, different lures. Big trout in Lake Edward of Quebec province and other streams and lakes of that region rarely are found on the surface feeding on flies until the 20th of May, with June the best possible month. Although the season on trout in Quebec opens on May first it is generally not until between the fifth and fifteenth of the month of May that the ice is out. Thereafter follows a space of time when the trout lie low, and close to the bottom, finally coming to the surface in late May. The season of surface feeding in this province, and therefore fly fishing on the surface, is very short. In fact, about the first of July, strange as it may seem, the trout begin their movement down into deep water. Thus, even as early as July it will be found that surface flies of the artificial variety will prove inadequate and it is only by trolling and the use of live bait, played deep, that one has any real sport and acquires the fish he is after. To a certain extent the same is true of New Brunswick streams, although there they are on the surface longer. Rangeley Lake and other famous streams and lakes in Maine are best fished at the first part of the season's opening, and again during the last part of the month of August. In fact it may be said that the best trout fishing in Maine is during the month of August.

It can be said with every degree of truth that the further north you go (as into Quebec province), the more untutored are the trout. In New York state, where the streams and lakes are extensively fished, small flies, and especially dry flies, are much used. Whereas your flies on New York waters will have to be selected in small sizes, the No. 12 is most generally used, with flies still smaller to be used for the so-called "educated" trout. As opposed to this the "uneducated" trout of Quebec, New Brunswick, and, to some extent, in parts of Maine, the flies best used are quite large. In fact, those tied to Nos. 3 and 5 hooks are recommended. Favorite Quebec and New Brunswick flies in the wet fly class are the Professor, Queen of the Waters, Grizzly King, Gray and Green Drakes, Montreal, Silver Doctor, Coachman, the various Hackles and the Scarlet Ibis. Northern trout (Canadian trout) seem to like the bright colored flies, whereas these same flies in New York and other waters deeper down, are likely to be given comparatively little attention.

The five best true and tried wet fly patterns for use in the streams and ponds of Maine are the Montreal, the Silver Doctor, the Parmachene Belle, Brown Hackle and Grizzly King. Best flies for New York are the Coachman, Brown Hackle, Professor, Green Drake and Grizzly King.

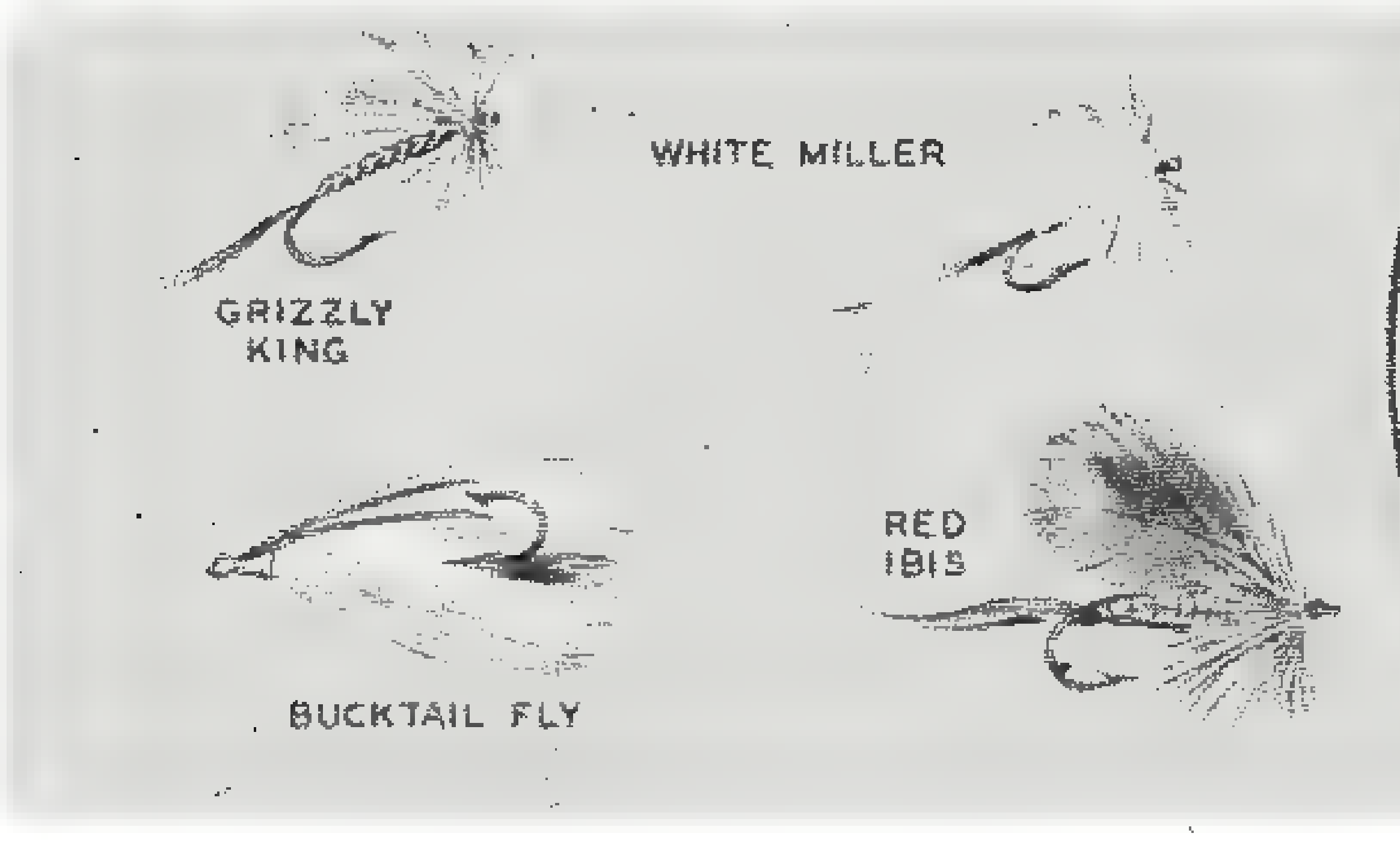
The trout waters that flow eastward into the Atlantic in the Allenghany region, taking in Maryland, Virginia, Pennsylvania and New York up to Lake Ontario, afford their best trout fishing from around early April to the end of June. The fishing in these sections has a far earlier start than in any other section of the country, being in the eastern temperate zone. Bait fishing is followed up in these sections during April, while fly fishing starts in May.

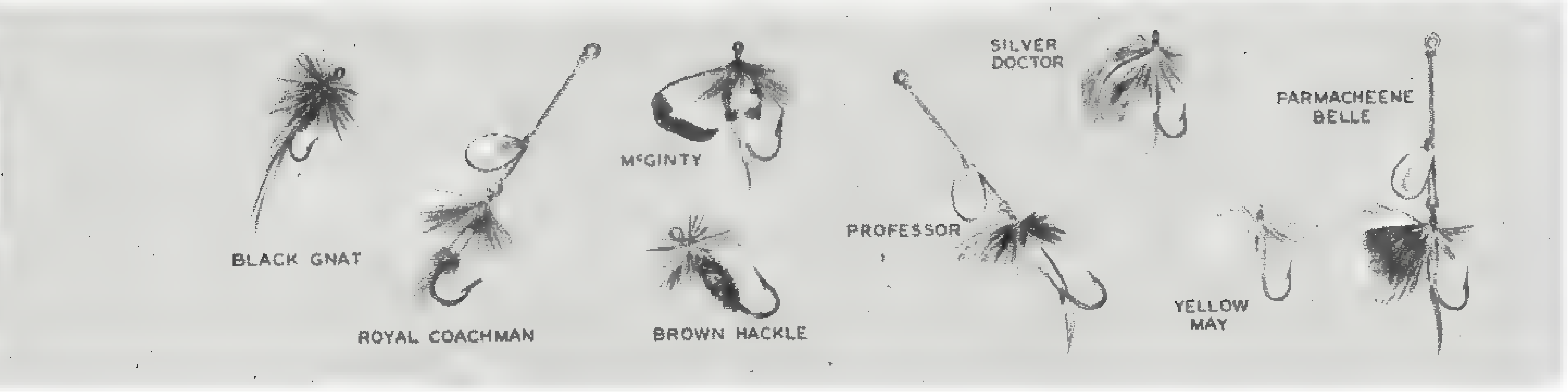
In some of the mountain lakes, ponds and streams in this section it will be found that various minnow lures, showing a silvery belly, are especially good. This is especially true in the Adirondacks in some sections of which trout practically refuse all manner of flies, but are taken on these imitation minnows. The chief dry fly fishing streams in the eastern part of the country are found in the state of New York, principally in Sullivan, Orange and Delaware counties of that state. Unexcelled New York dry flies are the Brown Bi-visible, the Fanwing Royal Coachman, Cahill Light, Hendrickson Dark, Wickham's Fancy and the Yellow May. For the whole eastern part of the United States, in trout territory, it is possible that the Brown Bi-visible would lay just claim to being the best all-around dry fly, added to which it might also be stated that the Brown Hackle and the Light Cahill are the two best all-around wet flies.

Pike and Wayne counties in Pennsylvania are choice trout fishing sections that are an-

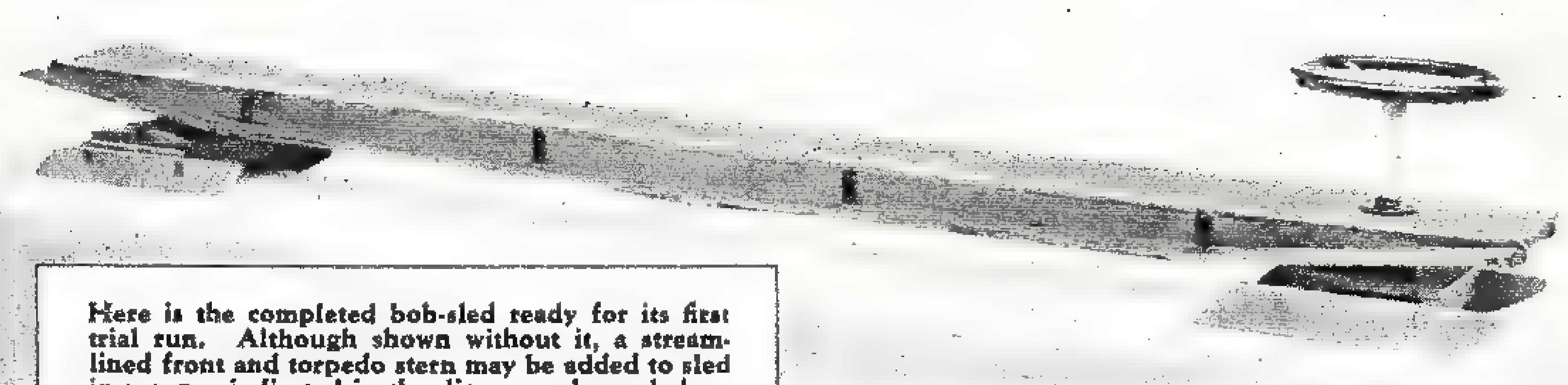
[*Continued on page 120*]

Circle—A full creel of high altitude trout from Rush Creek in Southern California. The speckled beauties average 8 to 10 inches. Below—Flies recommended by the author.

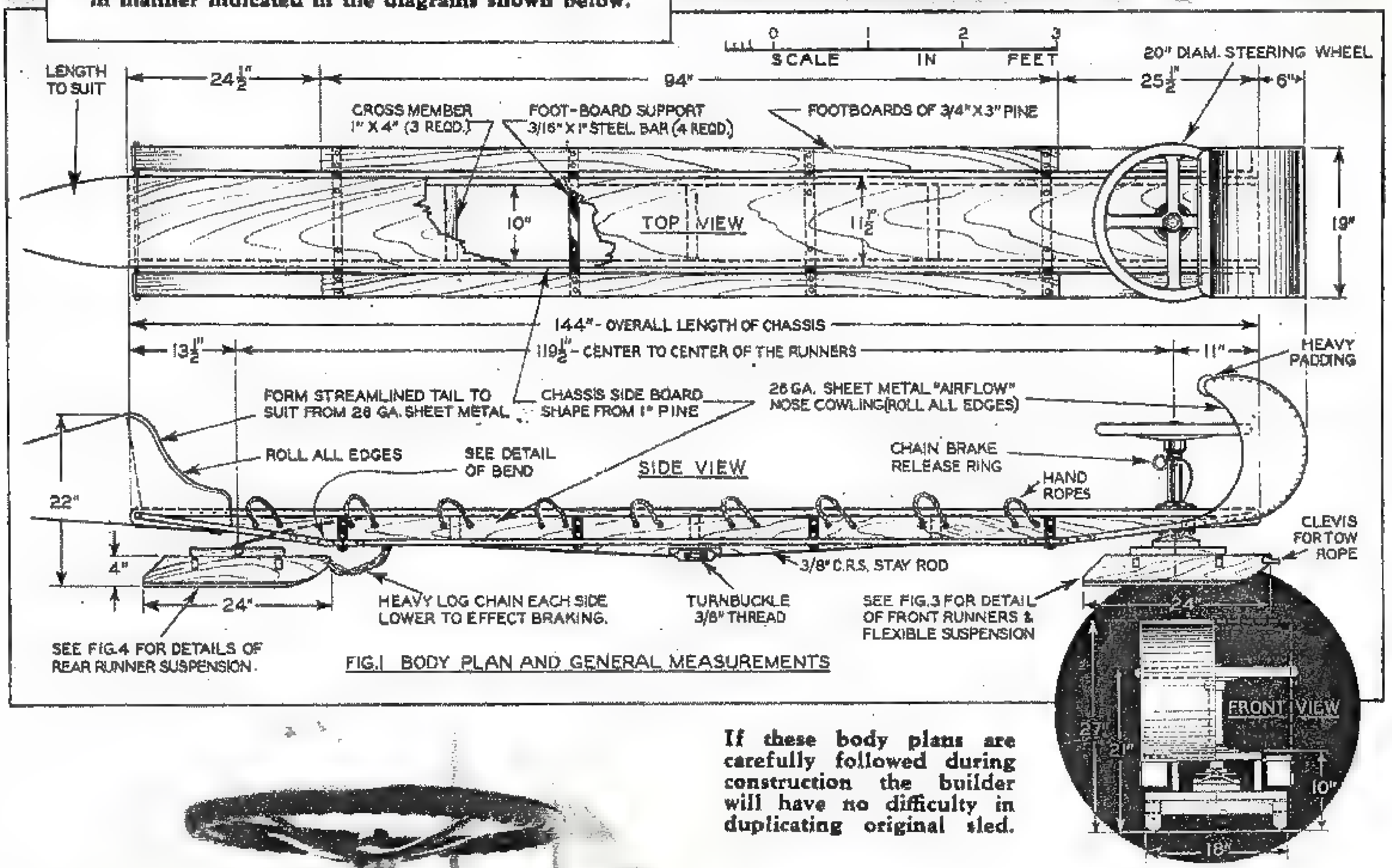




A BOB-SLED FOR WINTER SPORTS THRILLS



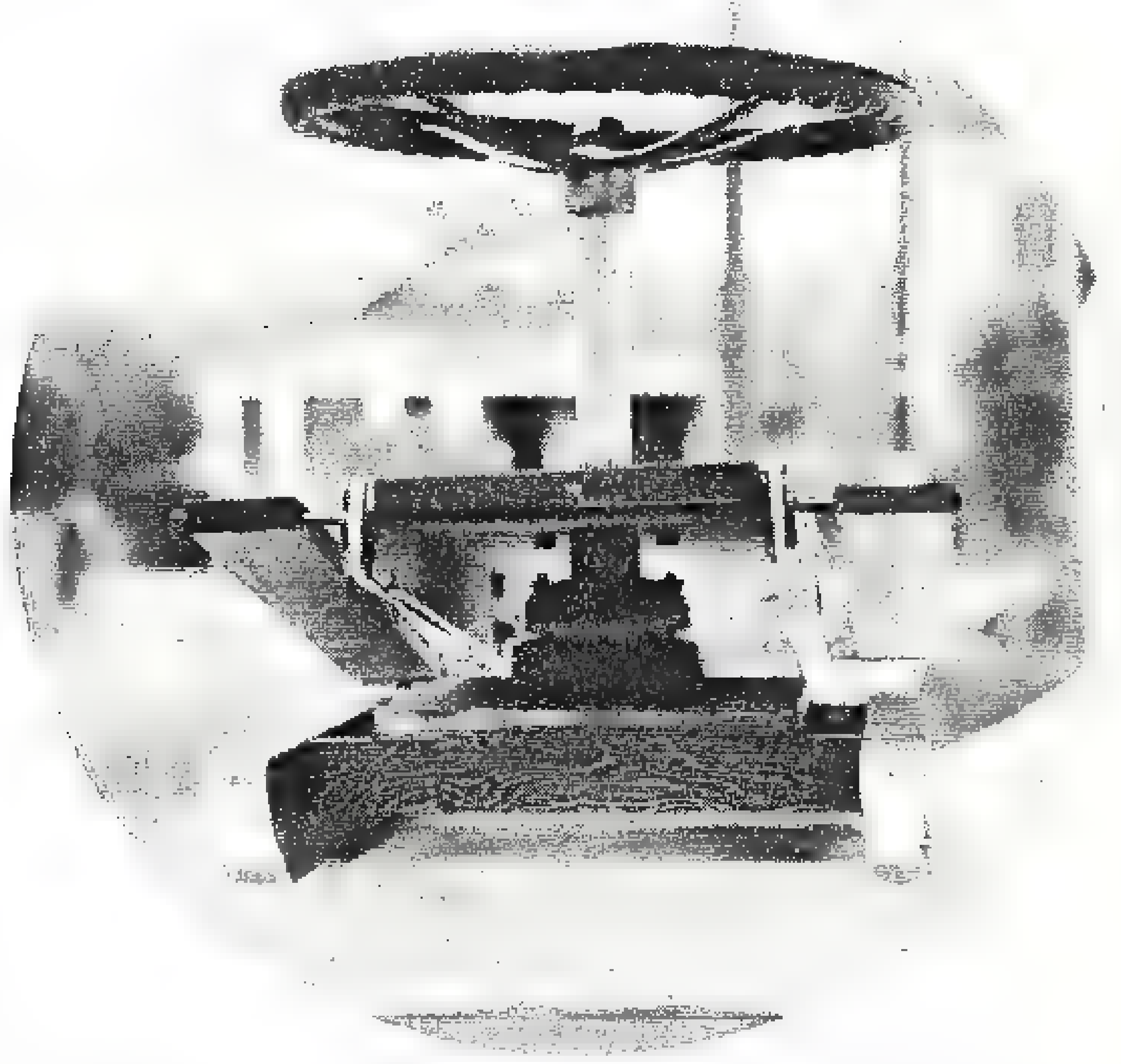
Here is the completed bob-sled ready for its first trial run. Although shown without it, a streamlined front and torpedo stern may be added to sled in manner indicated in the diagrams shown below.



SCALE IN FEET 0 1 2 3
20" DIAM. STEERING WHEEL
LENGTH TO SUIT
24½"
94"
25½"
6"
CROSS MEMBER 1" X 4" (3 REQD.)
FOOT-BOARD SUPPORT 3/16" X 1" STEEL BAR (4 REQD.)
FOOTBOARDS OF 3/4" X 3" PINE
10"
TOP VIEW
11½"
19"
144" - OVERALL LENGTH OF CHASSIS
13½"
119½" - CENTER TO CENTER OF THE RUNNERS
11"
HEAVY PADDING
FORM STREAMLINED TAIL TO SUIT FROM 28 GA. SHEET METAL
CHASSIS SIDE BOARD SHAPE FROM 1" PINE
28 GA. SHEET METAL "AIRFLOW" NOSE COWLING (ROLL ALL EDGES)
ROLL ALL EDGES
SEE DETAIL OF BEND
SIDE VIEW
CHAIN BRAKE RELEASE RING
HAND ROPES
22"
4"
24"
3/8" C.R.S. STAY ROD
CLEVIS FOR TOW ROPE
HEAVY LOG CHAIN EACH SIDE LOWER TO EFFECT BRAKING.
TURNBUCKLE 3/8" THREAD
SEE FIG.3 FOR DETAIL OF FRONT RUNNERS & FLEXIBLE SUSPENSION
SEE FIG.4 FOR DETAILS OF REAR RUNNER SUSPENSION.
24"
27"
21"
FRONT VIEW
10"
18"

FIG. 1 BODY PLAN AND GENERAL MEASUREMENTS

If these body plans are carefully followed during construction the builder will have no difficulty in duplicating original sled.



This front-end view shows the steering gear assembly. The steering shaft is held rigidly erect by a length of 1½-inch pipe and a floor flange mounted on top of chassis board. Steering wheel connects to front runners through universal joint disc.

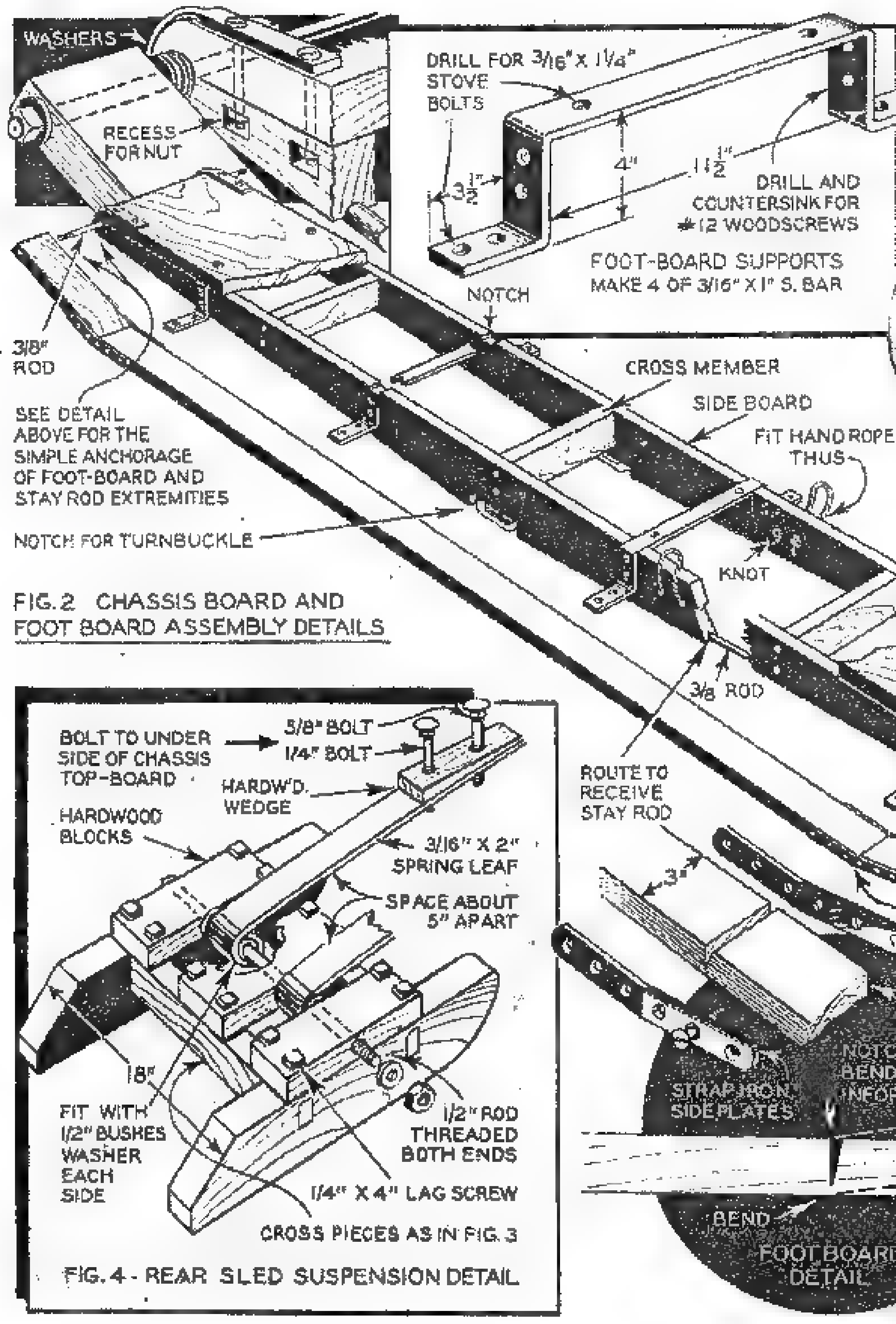
by Dick Cole

HERE is a bob-sled which will please the fancy of any winter sport enthusiast. It combines all the desirable features demanded in a bob-sled: light weight, strength, comfort, safety, ease of control and *Class.*

Figure 1 shows the general detail which will orient the prospective builder with the special features, general assembly and salient dimensions. At first glance one is impressed with its speedy appearance. Now look at the front runner assembly, and note that it is connected to the steering shaft with a universal joint. This is shown in assembly form in Figure 3. The joint is of the fabric disc type, prevalent on many cars several years ago. It permits the front runners to pitch and to rock through an angle of about fifteen degrees without the slightest lost motion, or lash, in the steering shaft itself. The parts needed for this can be picked up at any auto wrecking yard for a few cents.

Now for the back runner assembly. Note that it is connected to the chassis board with spring leaves, which contribute flexibility to the bob-sled. The "flexible" feature adds to the safety, as well as to the comfort, of the riders. If a bob-sled is too rigid it is likely to be upset if the runners on one side hit a hummock of ice. This bob-sled rides the hummocks like a knee-action car.

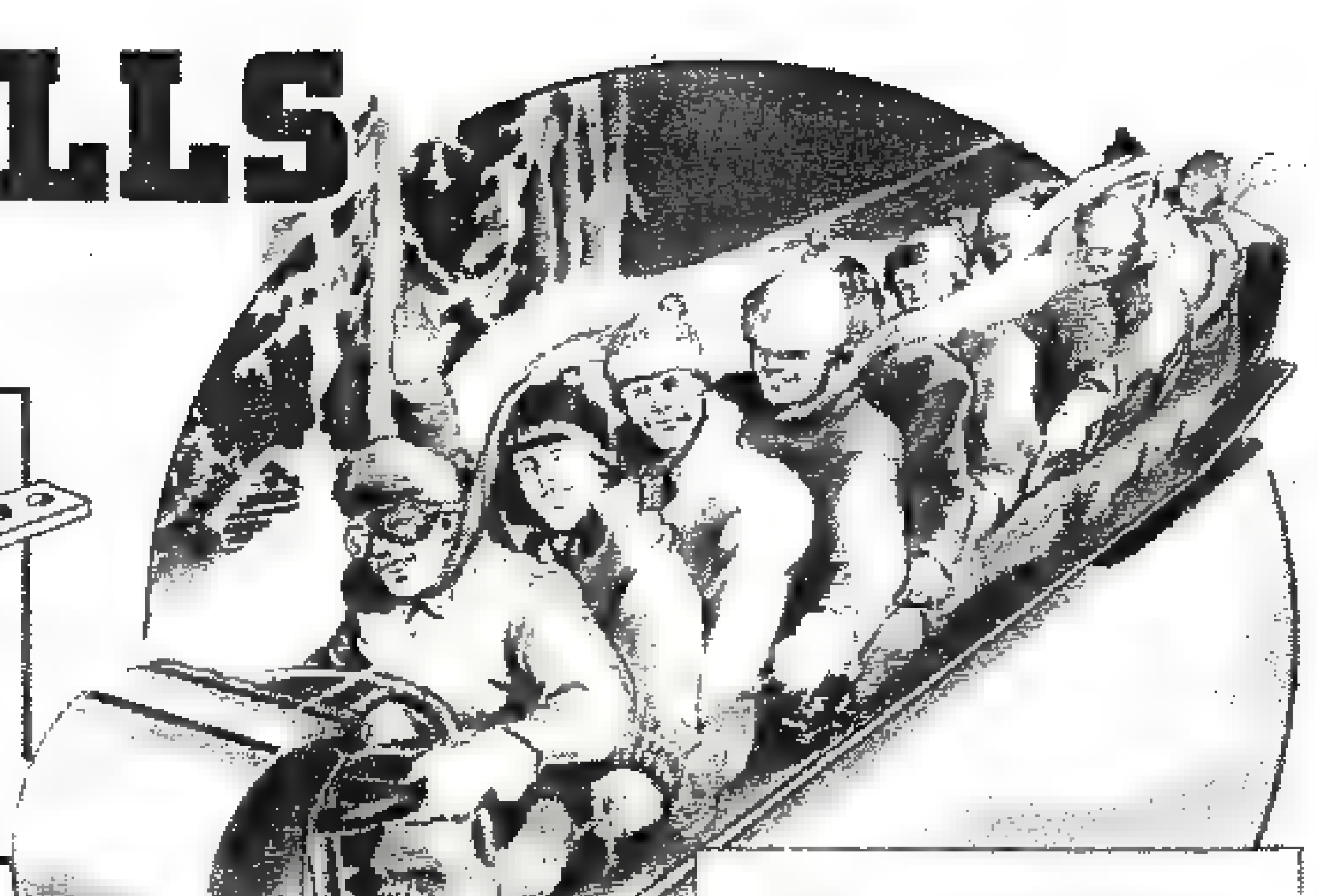
It might be well to explain the reason for the turnbuckles underneath the middle of the bob-sled. These provide adjustment to two ⅜" stay-rods which pass completely under the chassis and contribute great strength and rigidity to the structure. Their use permits the use of a light weight chassis board, only ⅞" thick, instead of the use of a heavy, non-reinforced plank. The construction of the



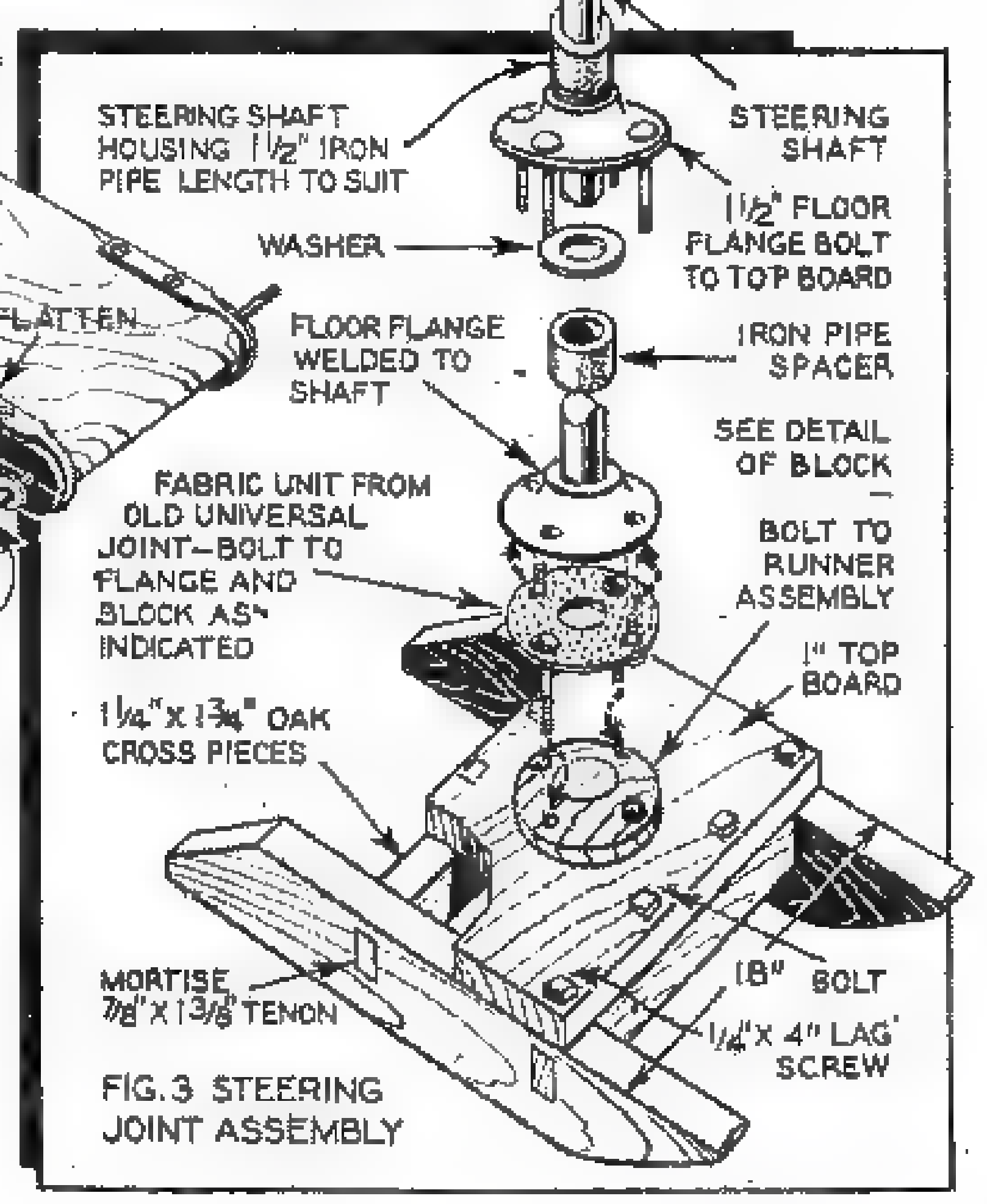
WASHERS
RECESS FOR NUT
DRILL FOR 3/16" X 1¼" STOVE BOLTS
3½"
4"
1½"
DRILL AND COUNTERSINK FOR #12 WOODSCREWS
FOOT-BOARD SUPPORTS MAKE 4 OF 3/16" X 1" S. BAR
NOTCH
3/8" ROD
SEE DETAIL ABOVE FOR THE SIMPLE ANCHORAGE OF FOOT-BOARD AND STAY ROD EXTREMITIES
CROSS MEMBER
SIDE BOARD
FIT HAND ROPES THUS
NOTCH FOR TURNBUCKLE
KNOT
CHASSIS TOP BOARD
3/8 ROD
1"
11½
FLATTEN
3/8" ROD
ROUTE TO RECEIVE STAY ROD
3"
STRAP IRON SIDE PLATES
NOTCH FOR BEND AND REINFORCE
BEND
FOOT BOARD DETAIL
BOLT TO UNDER SIDE OF CHASSIS TOP-BOARD
5/8" BOLT
1/4" BOLT
HARDW'D. WEDGE
HARDWOOD BLOCKS
3/16" X 2" SPRING LEAF
SPACE ABOUT 5" APART
18"
FIT WITH 1/2" BUSHES WASHER EACH SIDE
1/2" ROD THREADED BOTH ENDS
1/4" X 4" LAG SCREW
CROSS PIECES AS IN FIG. 3

FIG. 2 CHASSIS BOARD AND FOOT BOARD ASSEMBLY DETAILS

FIG. 4 - REAR SLED SUSPENSION DETAIL



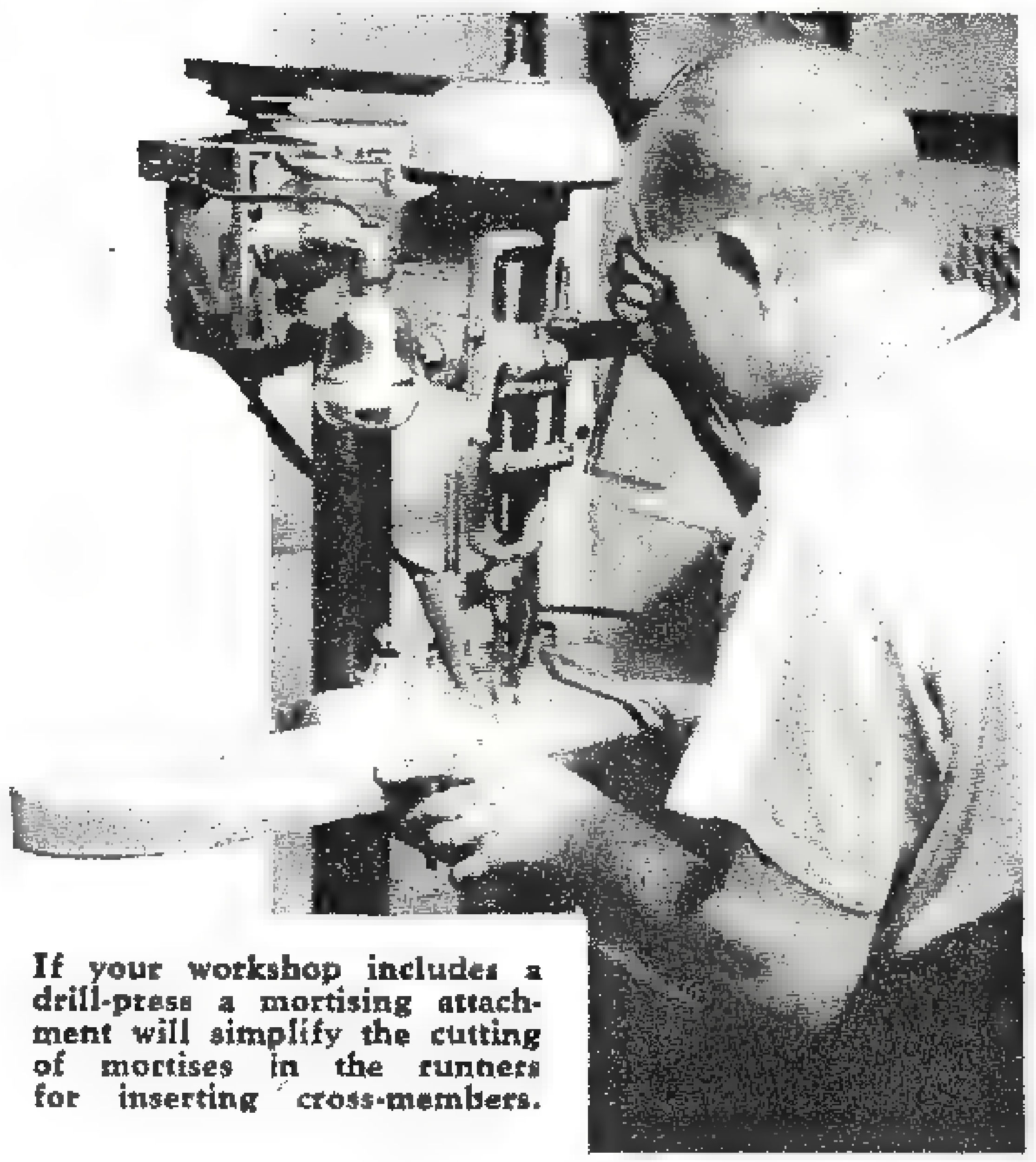
This streamlined knee-action bob-sled provides new winter sports thrills. It comfortably seats ten adult riders.



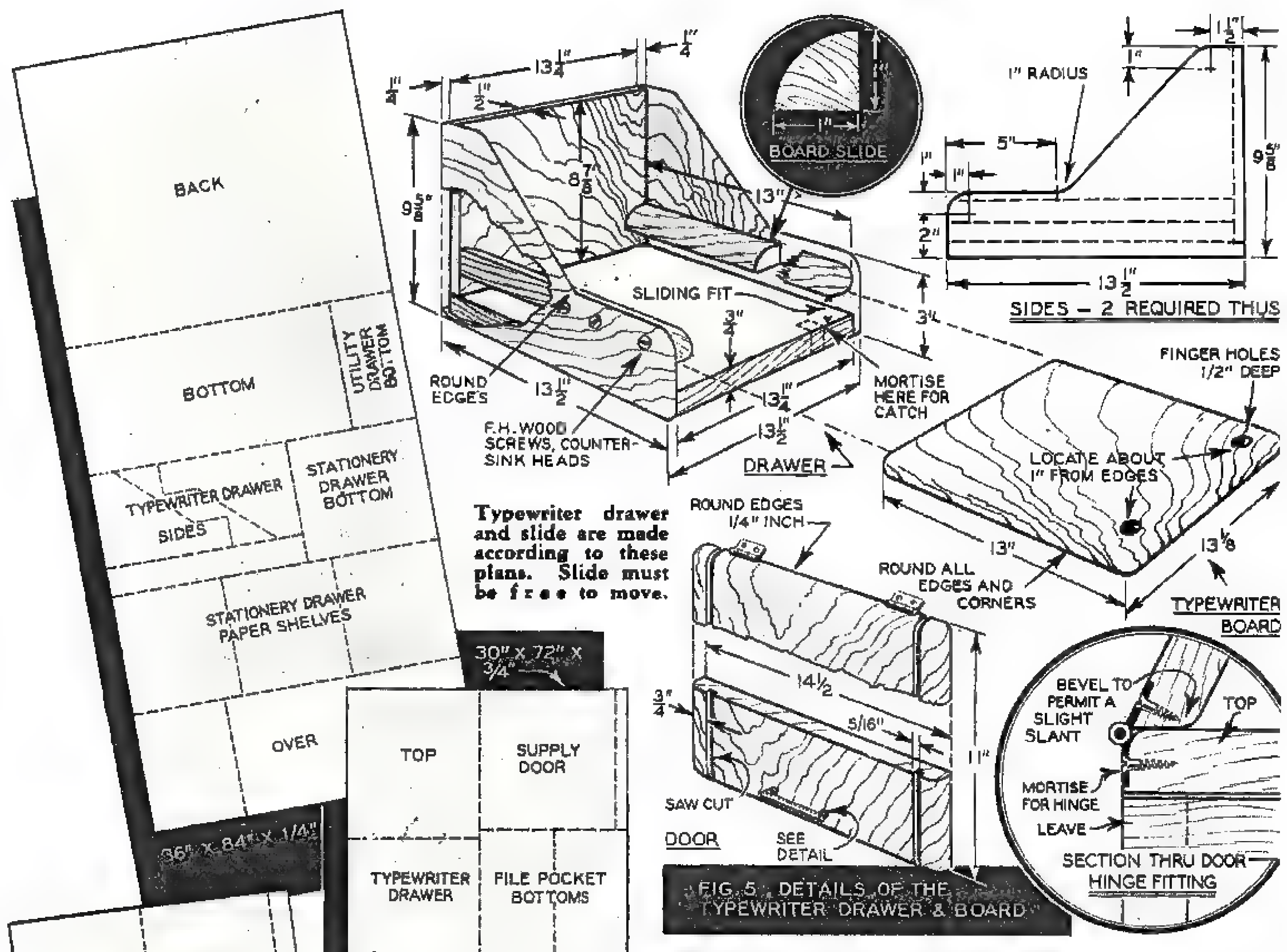
STEERING SHAFT HOUSING 1½" IRON PIPE LENGTH TO SUIT
STEERING SHAFT
1½" FLOOR FLANGE BOLT TO TOP BOARD
WASHER
FLOOR FLANGE WELDED TO SHAFT
IRON PIPE SPACER
SEE DETAIL OF BLOCK
FABRIC UNIT FROM OLD UNIVERSAL JOINT—BOLT TO FLANGE AND BLOCK AS INDICATED
BOLT TO RUNNER ASSEMBLY
1" TOP BOARD
1¼" X 1¾" OAK CROSS PIECES
MORTISE ⅞" X 1⅜" TENON
18" BOLT
¼" X 4" LAG SCREW

FIG. 3 STEERING JOINT ASSEMBLY

The universal steering assembly is clearly shown above. A fabric unit from a wrecked car universal joint provides the knee-action.



If your workshop includes a drill-press a mortising attachment will simplify the cutting of mortises in the runners for inserting cross-members.


BACK
BOTTOM
UTILITY DRAWER BOTTOM
TYPEWRITER DRAWER SIDES
STATIONERY DRAWER BOTTOM
STATIONERY DRAWER PAPER SHELVES
OVER
36" x 84" x 1/4"
30" x 72" x 3/4"
TOP
SUPPLY DOOR
BOARD SLIDE
1"
1" RADIUS
5"
2"
9 5/8"
13 1/2"
SIDES – 2 REQUIRED THUS
13 3/4"
1/4"
1/2"
8 7/8"
13"
SLIDING FIT
3/4"
3 1/4"
ROUND EDGES
13 1/2"
13 3/4"
F.H. WOOD SCREWS, COUNTER-SINK HEADS
MORTISE HERE FOR CATCH
DRAWER
FINGER HOLES 1/2" DEEP
LOCATE ABOUT 1" FROM EDGES
13 1/8
ROUND ALL EDGES AND CORNERS
TYPEWRITER BOARD
ROUND EDGES 1/4" INCH
14 1/2
5/16"
11"
SAW CUT
DOOR
SEE DETAIL
BEVEL TO PERMIT A SLIGHT SLANT
TOP
MORTISE FOR HINGE
LEAVE
SECTION THRU DOOR HINGE FITTING

Typewriter drawer and slide are made according to these plans. Slide must be free to move.

FIG. 5. DETAILS OF THE TYPEWRITER DRAWER & BOARD

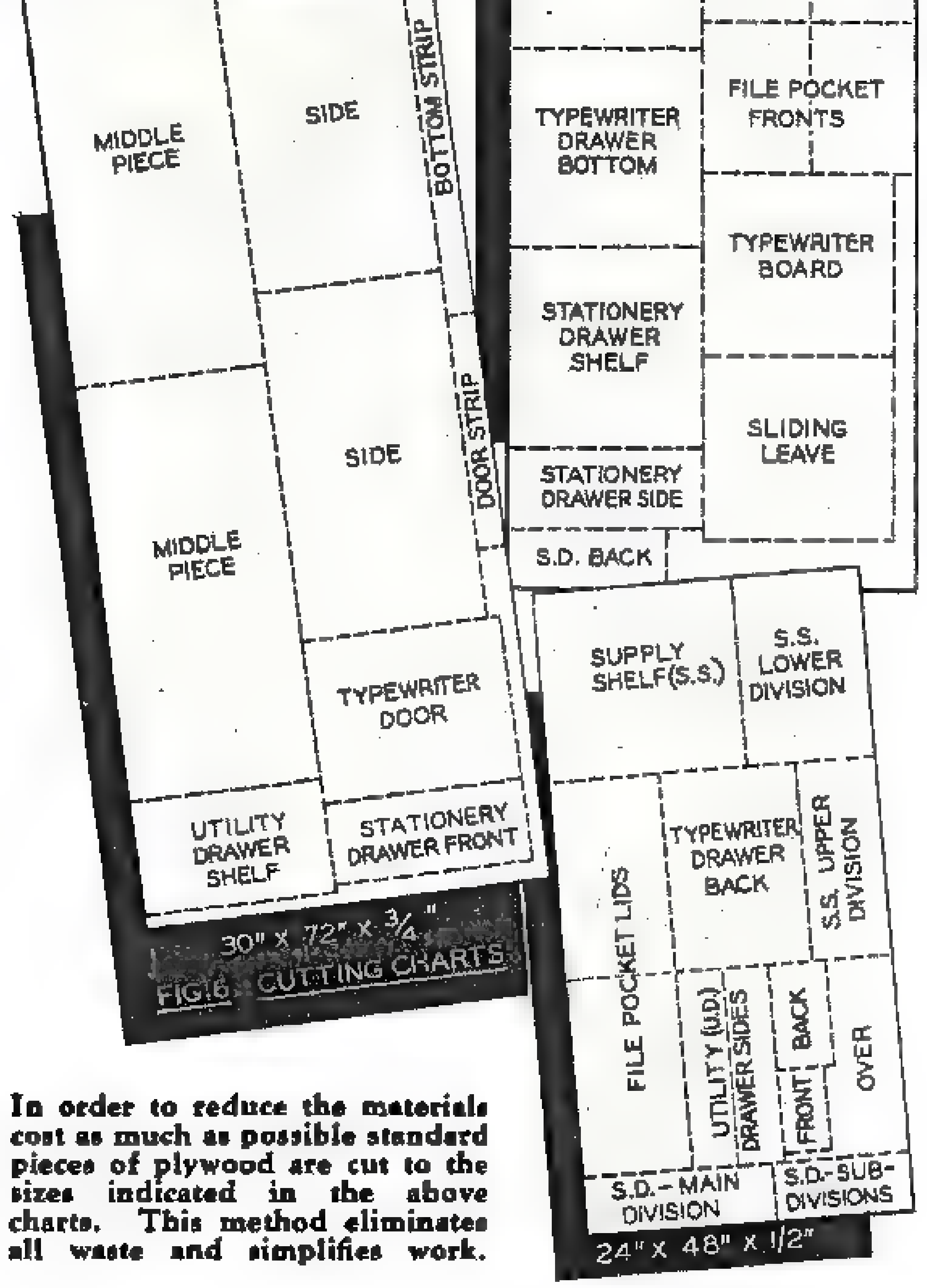

TYPEWRITER DRAWER
FILE POCKET BOTTOMS
TYPEWRITER DRAWER BOTTOM
FILE POCKET FRONTS
TYPEWRITER BOARD
STATIONERY DRAWER SHELF
SLIDING LEAVE
STATIONERY DRAWER SIDE
S.D. BACK
MIDDLE PIECE
SIDE
BOTTOM STRIP
SIDE
DOOR STRIP
MIDDLE PIECE
TYPEWRITER DOOR
UTILITY DRAWER SHELF
STATIONERY DRAWER FRONT
30" x 72" x 3/4"
SUPPLY SHELF (S.S.)
S.S. LOWER DIVISION
FILE POCKET LIDS
TYPEWRITER DRAWER BACK
S.S. UPPER DIVISION
UTILITY (U.D.) DRAWER SIDES
FRONT
BACK
OVER
S.D.-MAIN DIVISION
S.D.-SUB-DIVISIONS
24" x 48" x 1/2"

FIG.6 CUTTING CHARTS

In order to reduce the materials cost as much as possible standard pieces of plywood are cut to the sizes indicated in the above charts. This method eliminates all waste and simplifies work.

Two wide lines run up the front panel of the desk. Check the supply door, stationery drawer front and the typewriter door, making the front panel carefully so your lines do not stagger. These lines are ¾" from the side and $\frac{5}{16}$" wide. It is advised that you make the shelves under the drawers from flat pieces rather than the usual frame. It saves time, is easier and costs but little more. Don't forget to round the front edges of the drawers and doors about ¼". The lids on the file pockets and the board on which the machine is placed are rounded on all edges and corners. Round all projecting edges of the typewriter drawer itself. The front and back edges of the leaf are rounded to fit into the sliding groove in the assembled desk. It is wise, when all your pieces are cut, to carefully sand them in the flat.

Refer to the assembly drawing in Figure 2 to give yourself a good idea of how to proceed in assemblying the desk. Note that the leaf slides are put on at once, not later. Mark the location of the middle pieces to the bottom, glue and nail, then bore holes for the dowels. This should be repeated also on most other joints. Putting on the top and back will give you a good idea of how it is built.

Next install the center shelves while they

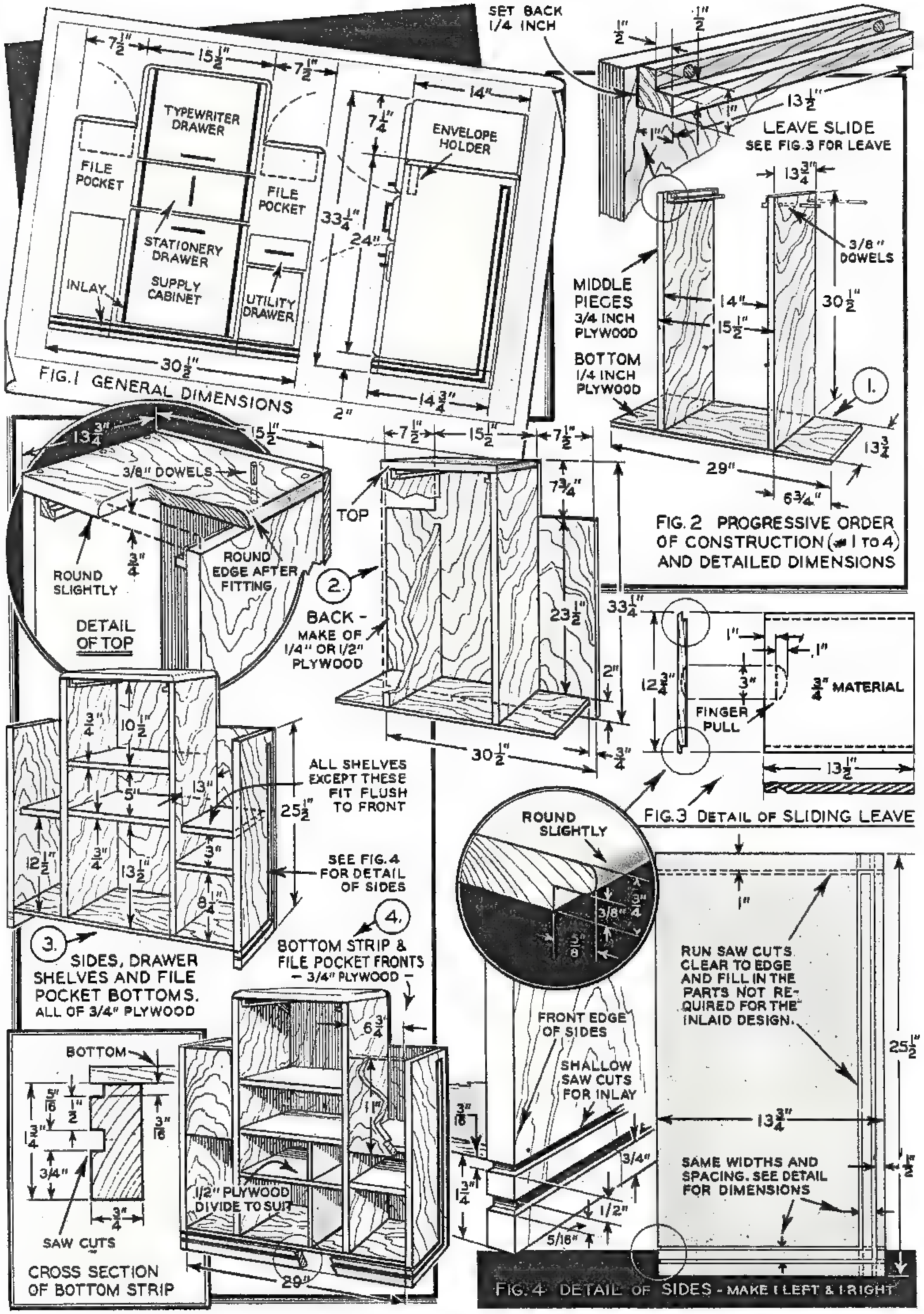


FIG.1 GENERAL DIMENSIONS

FIG. 2 PROGRESSIVE ORDER OF CONSTRUCTION (# 1 TO 4) AND DETAILED DIMENSIONS

FIG.3 DETAIL OF SLIDING LEAVE

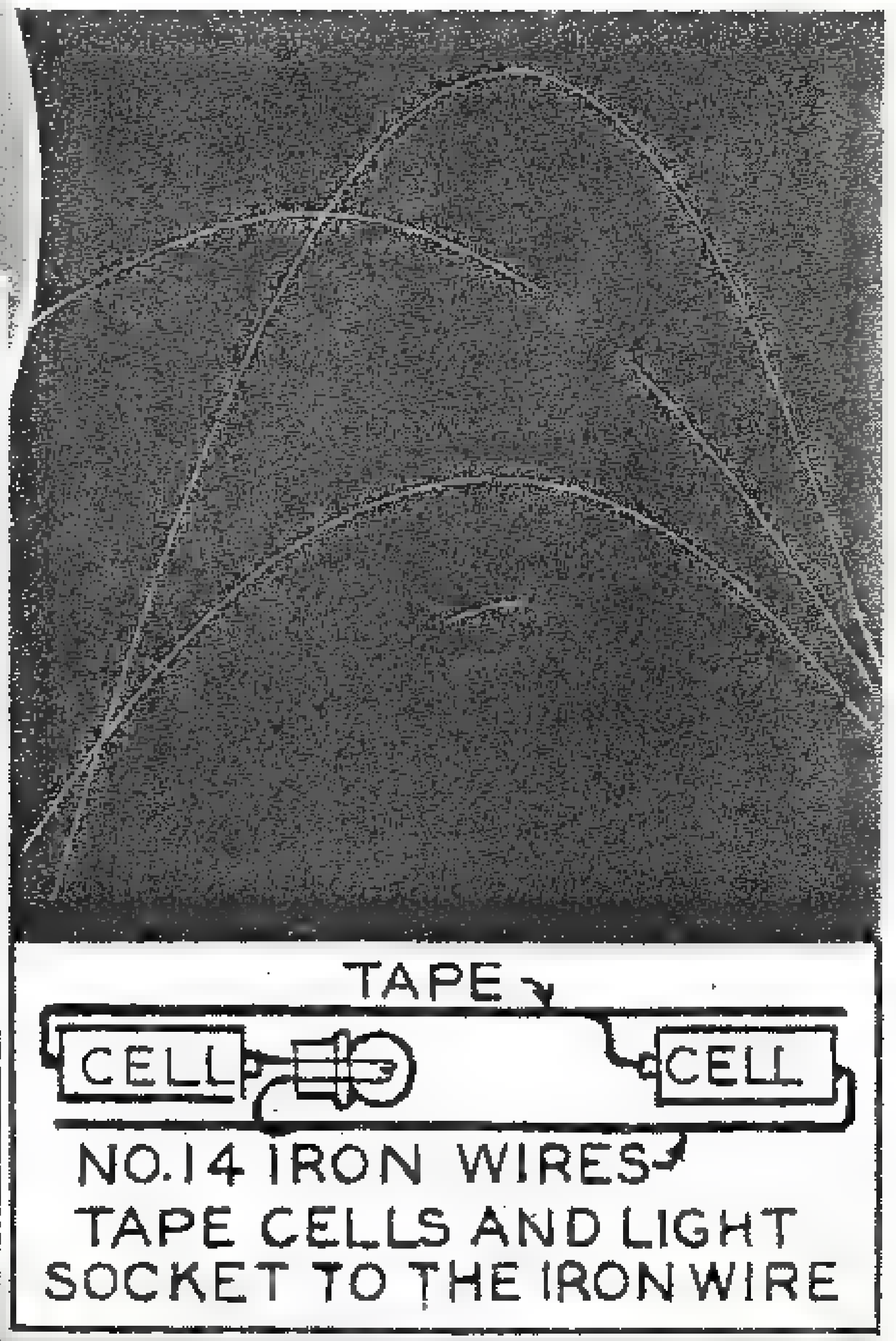
FIG. 4 DETAIL OF SIDES - MAKE 1 LEFT & 1 RIGHT

7 1/2"
15 1/2"
7 1/2"
TYPEWRITER DRAWER
FILE POCKET
FILE POCKET
STATIONERY DRAWER
SUPPLY CABINET
INLAY
UTILITY DRAWER
30 1/2"
14"
7 1/4"
ENVELOPE HOLDER
33 1/4"
24"
14 3/4"
2"
SET BACK 1/4 INCH
1/2"
1/2"
1"
1"
13 1/2"
LEAVE SLIDE
SEE FIG.3 FOR LEAVE
13 3/4"
3/8" DOWELS
MIDDLE PIECES 3/4 INCH PLYWOOD
14"
15 1/2"
30 1/2"
BOTTOM 1/4 INCH PLYWOOD
1.
29"
6 3/4"
13 3/4
13 3/4"
15 1/2"
3/8" DOWELS
ROUND SLIGHTLY
3/4"
ROUND EDGE AFTER FITTING
DETAIL OF TOP
TOP
2.
BACK - MAKE OF 1/4" OR 1/2" PLYWOOD
7 1/2"
15 1/2"
7 1/2"
7 3/4"
23 1/2"
2"
33 1/4"
30 1/2"
3/4"
1"
1"
3"
12 3/4"
FINGER PULL
3/4" MATERIAL
13 1/2"
3/4"
10 1/2"
5"
13"
ALL SHELVES EXCEPT THESE FIT FLUSH TO FRONT
25 1/2"
12 1/2"
3/4"
13 1/2"
3"
8 1/4"
SEE FIG.4 FOR DETAIL OF SIDES
3.
SIDES, DRAWER SHELVES AND FILE POCKET BOTTOMS. ALL OF 3/4" PLYWOOD
4.
BOTTOM STRIP & FILE POCKET FRONTS – 3/4" PLYWOOD –
6 3/4"
11"
1/2" PLYWOOD DIVIDE TO SUIT
29"
BOTTOM
5/16"
1/2"
3/16"
1 3/4"
3/4"
3/4"
SAW CUTS
CROSS SECTION OF BOTTOM STRIP
ROUND SLIGHTLY
3/4"
3/8"
5/8"
3/16"
FRONT EDGE OF SIDES
SHALLOW SAW CUTS FOR INLAY
3/4"
1 3/4"
1/2"
5/16"
1"
RUN SAW CUTS CLEAR TO EDGE AND FILL IN THE PARTS NOT REQUIRED FOR THE INLAID DESIGN.
13 3/4"
25 1/2"
1/2"
SAME WIDTHS AND SPACING. SEE DETAIL FOR DIMENSIONS

General cabinet dimensions of the desk are covered in this diagram. On all joints where stress will be placed dowel pins should be used. Careful assembly will result in a workshop project that will equal many commercial desks of similar design.

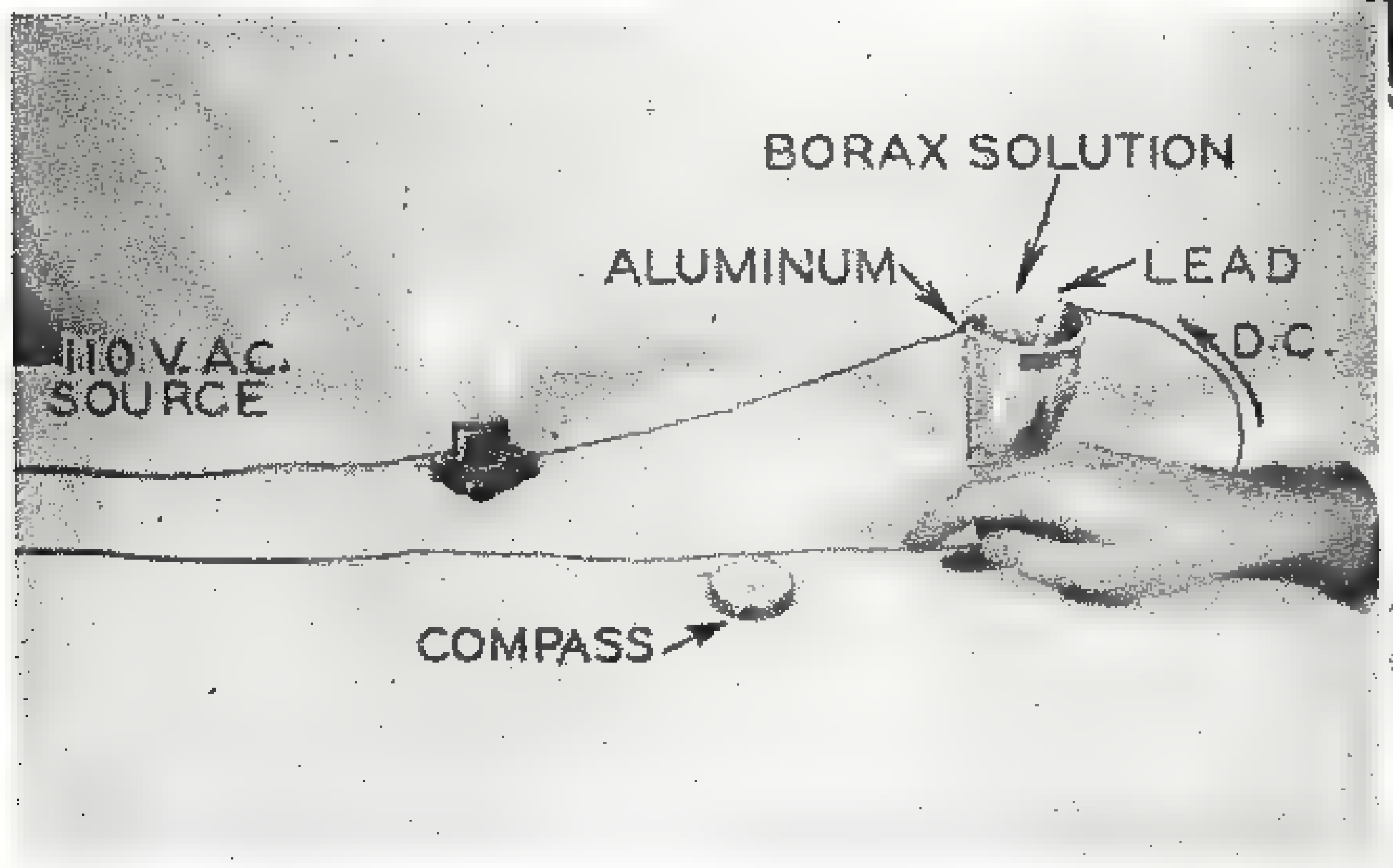
STRANGE FACTS ABOUT SCIENCE

Have you ever noticed that in the movies auto wheels turn backward? The camera shutter is responsible for this strange effect. Cut two cardboard discs; on one cut peep holes, on the other paint spokes. Attach discs to a handle and spin to see the effect.

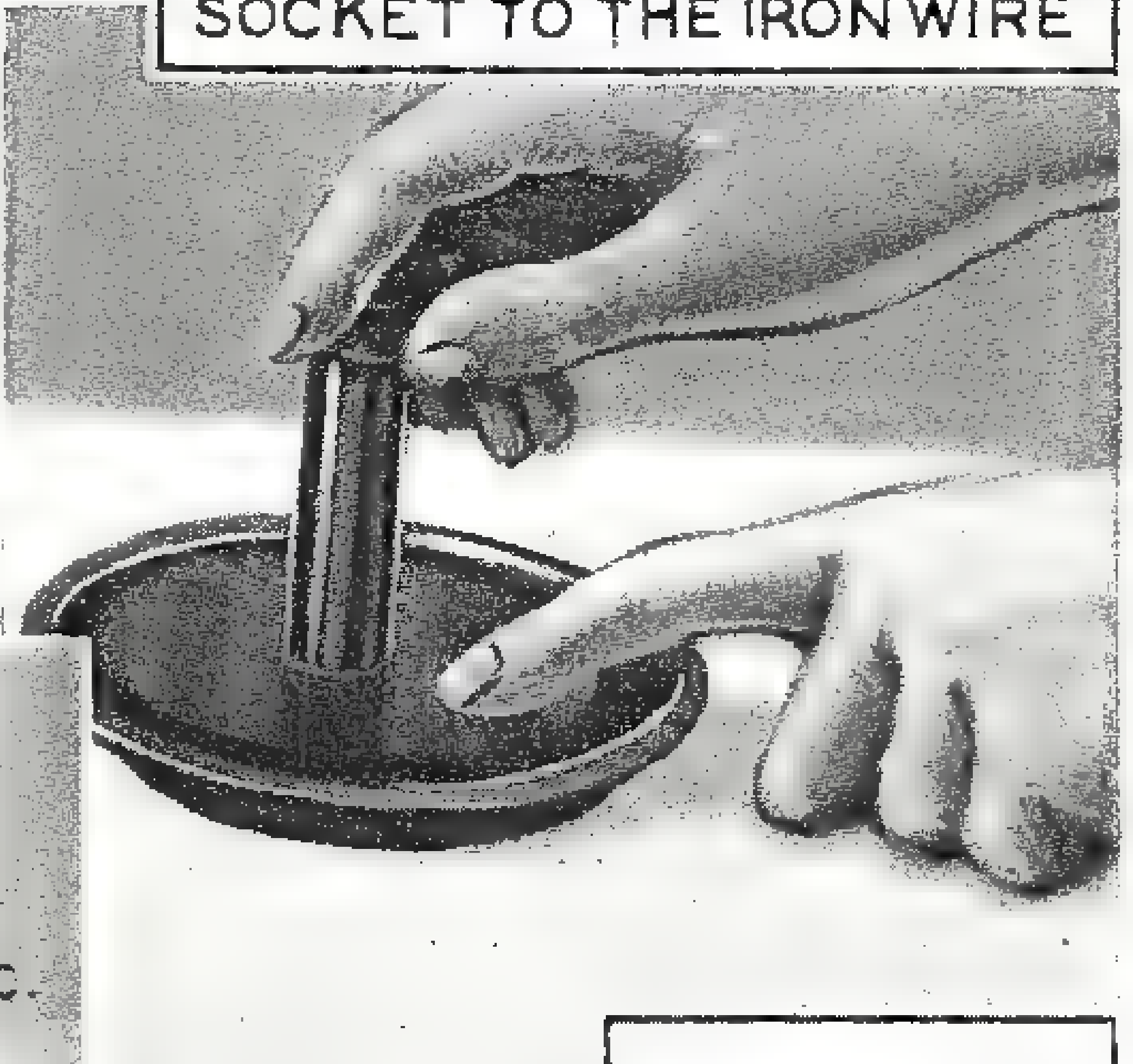


A ball when thrown always follows a parabola. To prove this wire up two flashlight cells with 14 wire. In the center attach a bulb. If unit is thrown before open camera lens on a dark night parabola shows on developed film.

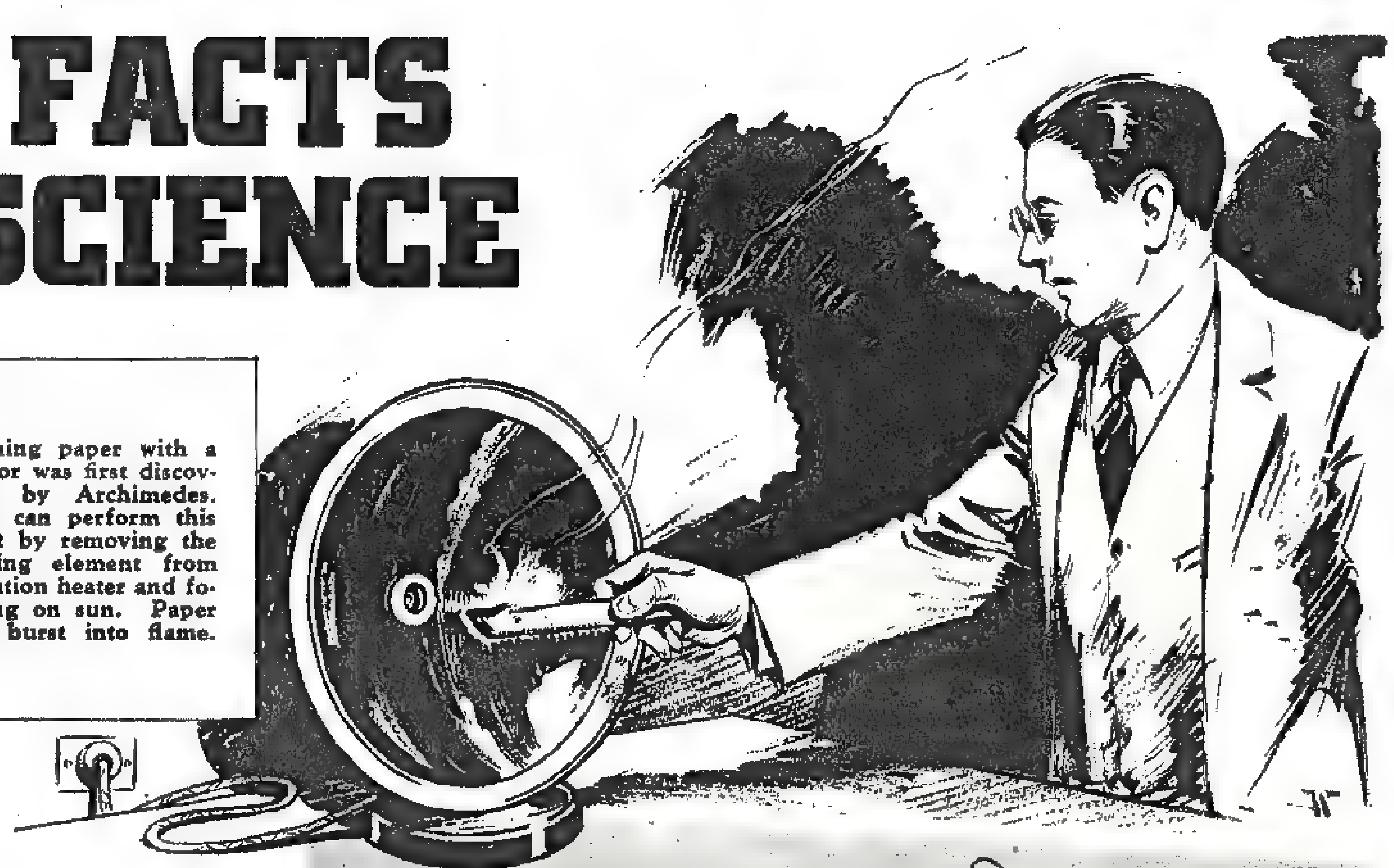
Although both the ice cubes and the water in the measuring glass, shown above, have the same temperature of 32 degrees the water does not have the cooling effect of the ice. Ice has greater cooling effect since it consumes more heat.



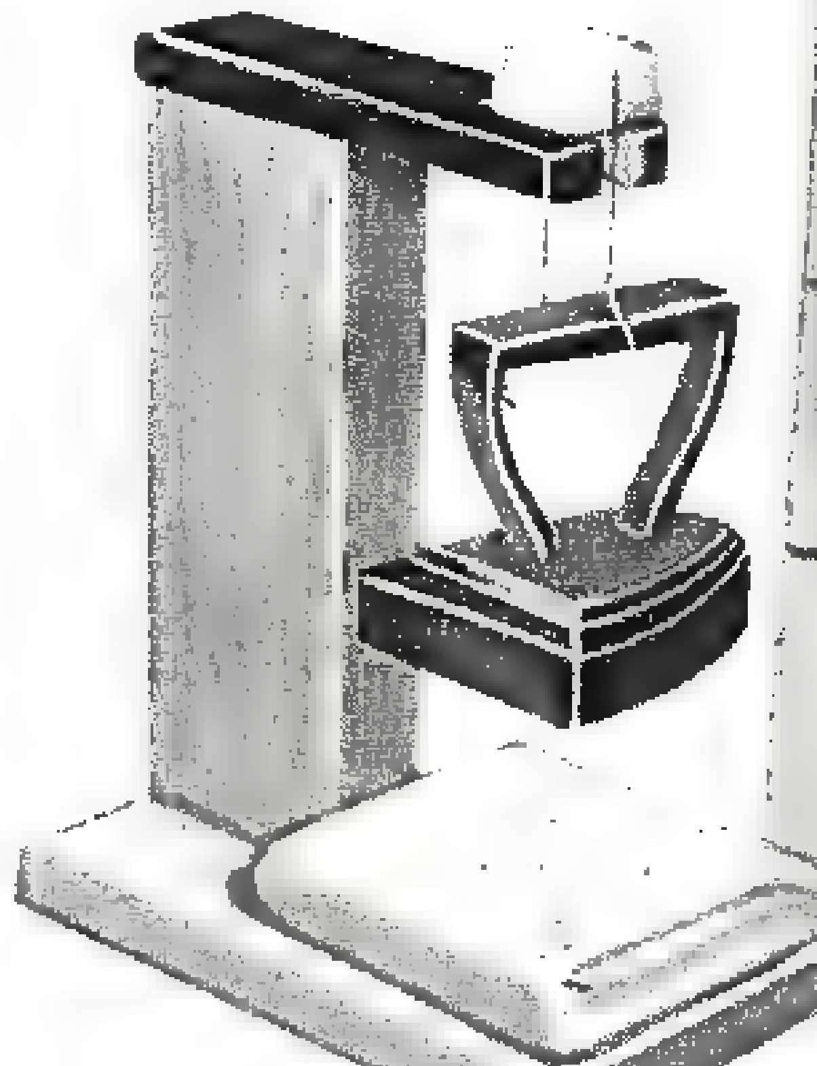
The method in which an alternating-to-direct current rectifier works is simply demonstrated with this apparatus. Connect an electric lamp in series with an aluminum and lead strip, placing within a borax solution. A compass brought near one of wires will show a deflection. On A. C. needle will not move.



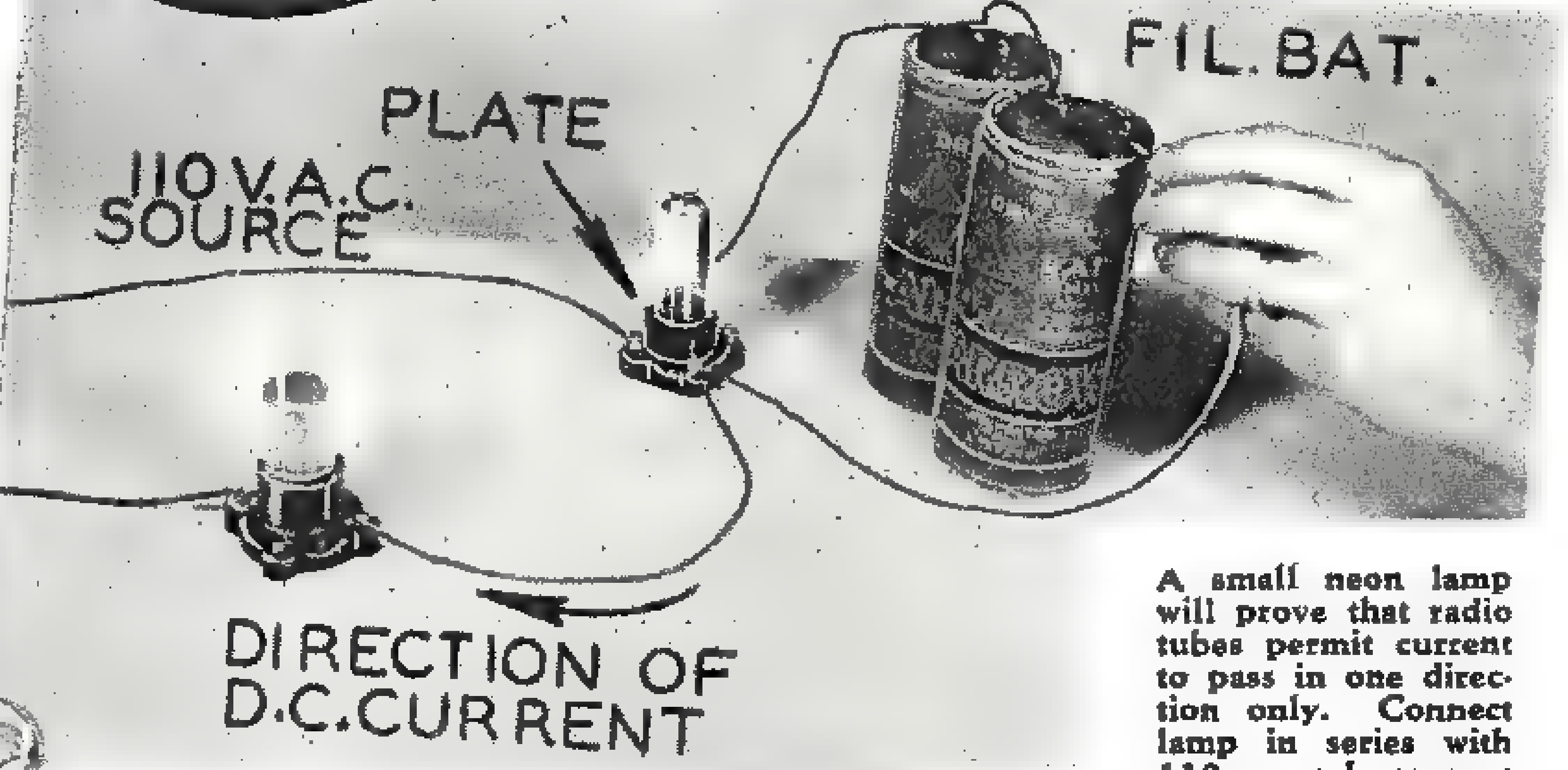
Static electricity that will produce a bright spark can be generated with the above apparatus. A small tin lid is attached to a wooden handle with a small nail to form an "electrophorous." Rub a stick of sealing wax with flannel cloth then touch wax to the tin lid. Upon touching lid with a finger tip spark is produced.



Burning paper with a mirror was first discovered by Archimedes. You can perform this stunt by removing the heating element from radiation heater and fofusing on sun. Paper will burst into flame.



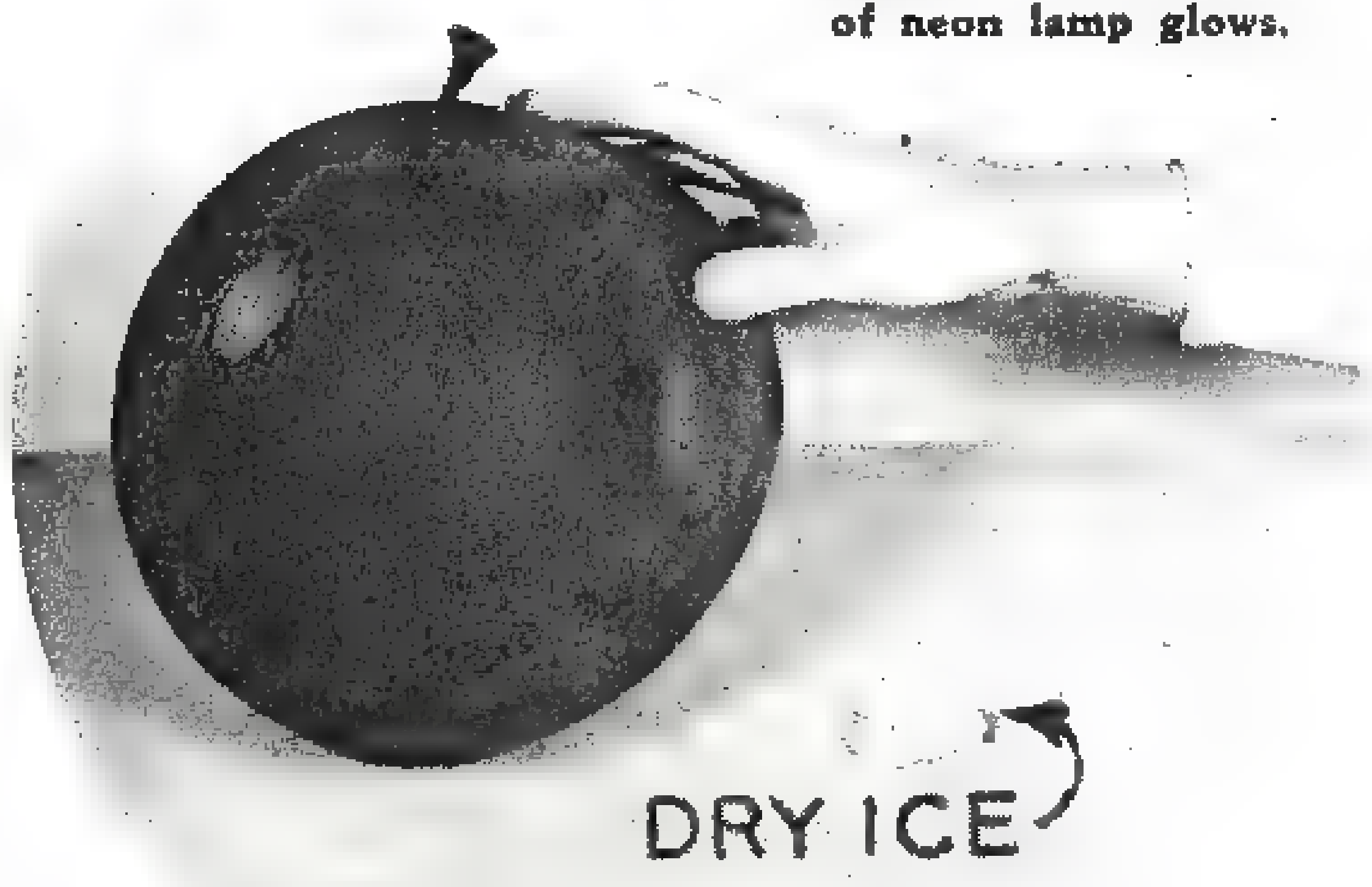
A wire passed completely through this ice cube still leaves it in one piece. As wire passes through, ice fuses together.



A small neon lamp will prove that radio tubes permit current to pass in one direction only. Connect lamp in series with 110-v. and connect plate and one filament to 110-v. also. When dry cells are connected to tube's filaments one plate of neon lamp glows.

THESE interesting scientific experiments can be performed without the use of expensive laboratory equipment to show the strange manner in which certain scientific principles act.

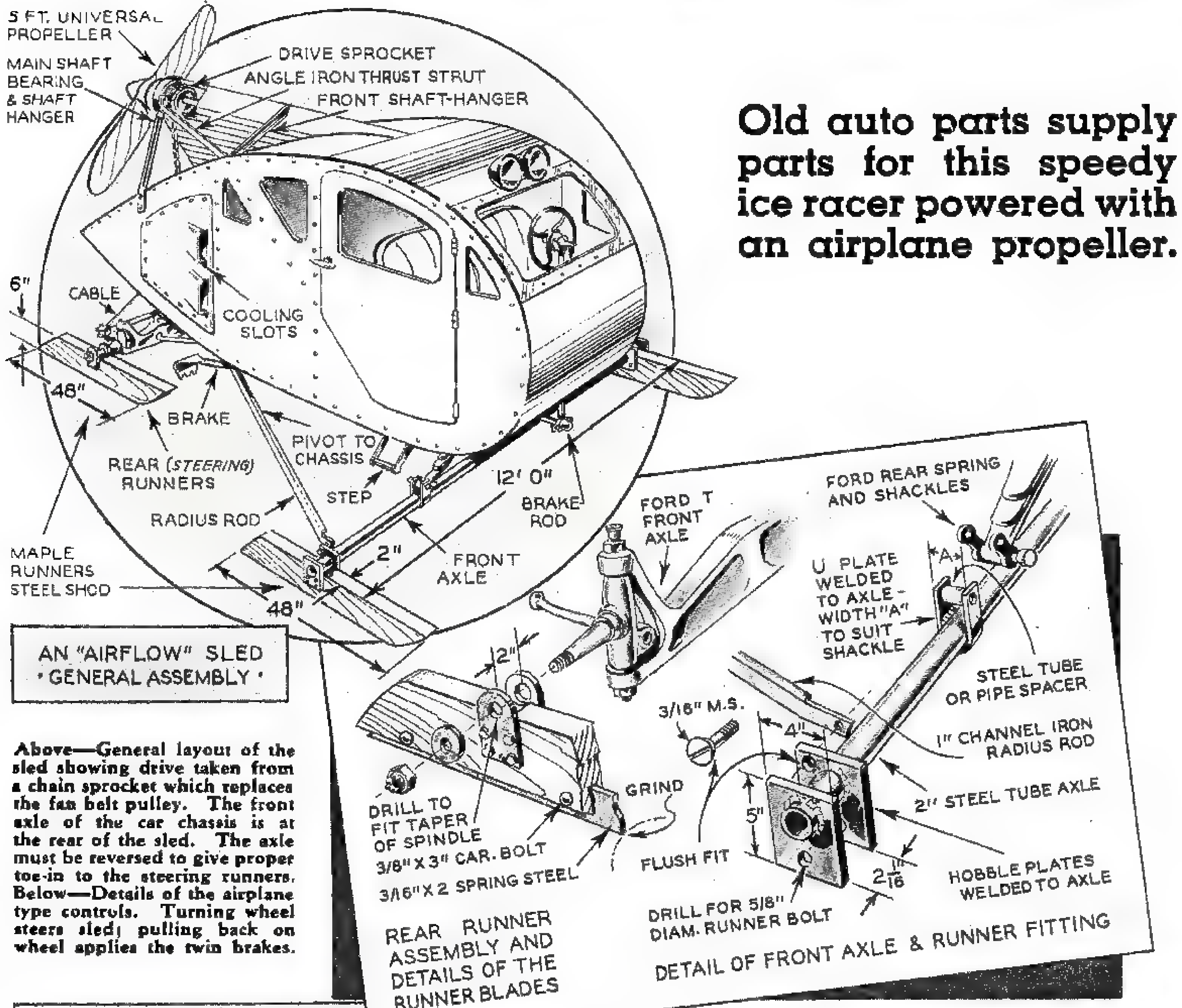
Dry ice sealed in a deflated toy balloon will cause it to blow up and burst, a piece of sealing wax can be made to produce static electricity, a neon electric bulb will show how a vacuum tube rectifier functions. These are only a few of the many stunts possible with the simple apparatus described here. Since most everyone is familiar with the theoretical explanations of these physics oddities only the method in which the stunts are performed are given. The experiments described here are simple enough even for those whose scientific knowledge is limited.



A toy balloon in which several pieces of dry ice have been placed will expand until it bursts if neck is closed. Stunt demonstrates how gas expands when changed from solid to vapor.

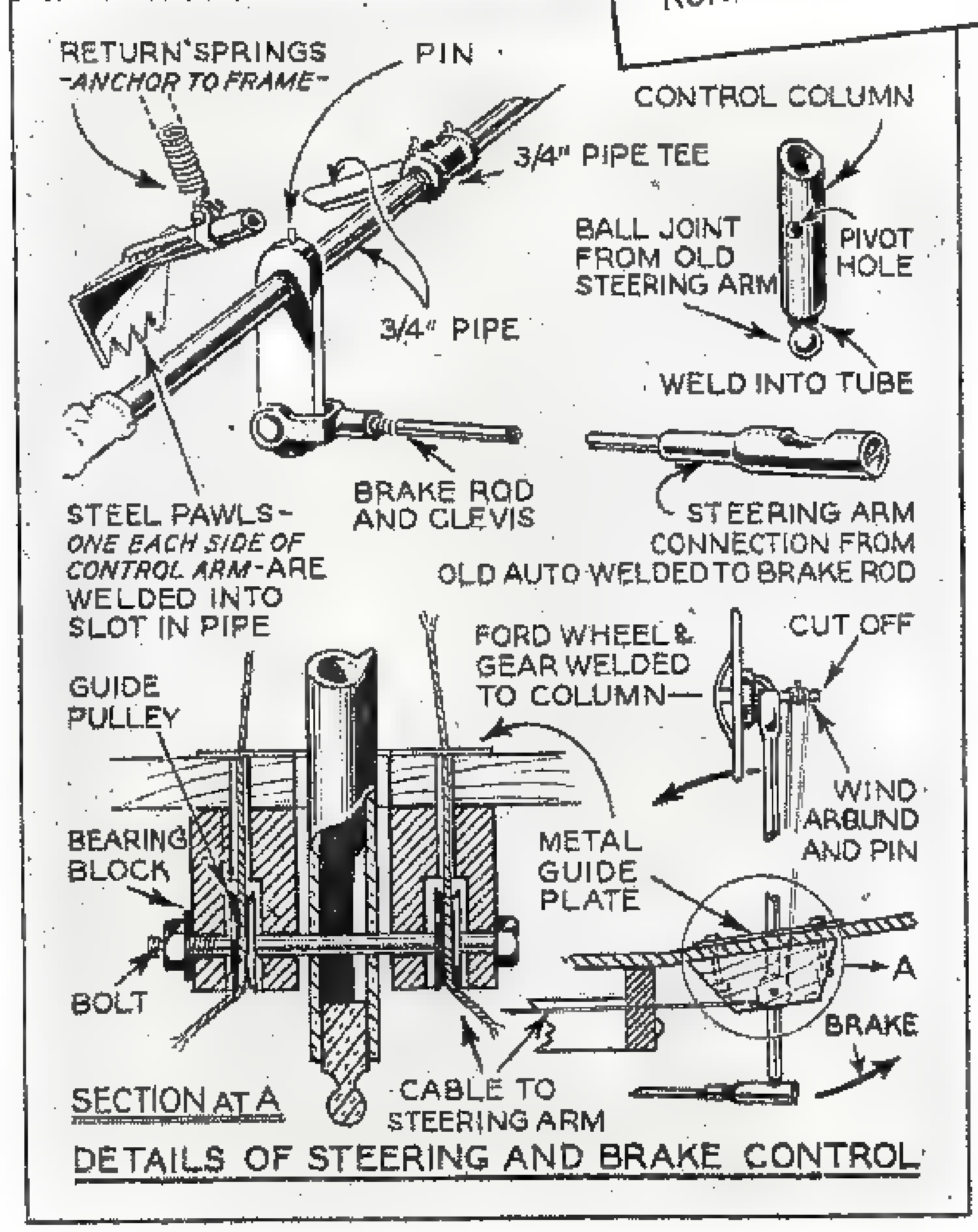
AIRPLANE THRILLS WITH "AIRFLOW" ICE SLED

Old auto parts supply parts for this speedy ice racer powered with an airplane propeller.


5 FT. UNIVERSAL PROPELLER
MAIN SHAFT BEARING & SHAFT HANGER
DRIVE SPROCKET
ANGLE IRON THRUST STRUT
FRONT SHAFT-HANGER
6"
CABLE
COOLING SLOTS
48"
BRAKE
REAR (STEERING) RUNNERS
PIVOT TO CHASSIS
STEP
RADIUS ROD
12' 0"
BRAKE ROD
2"
FRONT AXLE
MAPLE RUNNERS STEEL SHOD
48"
AN "AIRFLOW" SLED • GENERAL ASSEMBLY •
FORD T FRONT AXLE
FORD REAR SPRING AND SHACKLES
U PLATE WELDED TO AXLE - WIDTH "A" TO SUIT SHACKLE
A
2"
STEEL TUBE OR PIPE SPACER
3/16" M.S.
4"
1" CHANNEL IRON RADIUS ROD
GRIND
2" STEEL TUBE AXLE
DRILL TO FIT TAPER OF SPINDLE
5"
3/8" X 3" CAR. BOLT
FLUSH FIT
3/16" X 2 SPRING STEEL
$2\frac{1}{16}$"
HOBBLE PLATES WELDED TO AXLE
DRILL FOR 5/8" DIAM. RUNNER BOLT
REAR RUNNER ASSEMBLY AND DETAILS OF THE RUNNER BLADES
DETAIL OF FRONT AXLE & RUNNER FITTING

Above—General layout of the sled showing drive taken from a chain sprocket which replaces the fan belt pulley. The front axle of the car chassis is at the rear of the sled. The axle must be reversed to give proper toe-in to the steering runners. Below—Details of the airplane type controls. Turning wheel steers sled; pulling back on wheel applies the twin brakes.

Any type of runner may be used. Type shown is shod with old auto spring steel leaf runners, hollow ground.


RETURN SPRINGS -ANCHOR TO FRAME-
PIN
CONTROL COLUMN
3/4" PIPE TEE
BALL JOINT FROM OLD STEERING ARM
PIVOT HOLE
3/4" PIPE
WELD INTO TUBE
STEEL PAWLS - ONE EACH SIDE OF CONTROL ARM - ARE WELDED INTO SLOT IN PIPE
BRAKE ROD AND CLEVIS
STEERING ARM CONNECTION FROM OLD AUTO WELDED TO BRAKE ROD
GUIDE PULLEY
FORD WHEEL & GEAR WELDED TO COLUMN
CUT OFF
WIND AROUND AND PIN
BEARING BLOCK
METAL GUIDE PLATE
A
BOLT
BRAKE
SECTION AT A
CABLE TO STEERING ARM
DETAILS OF STEERING AND BRAKE CONTROL

by Lieut. Douglas Rolfe

AS EVERYONE knows, the junk yards are literally stacked with old worn out cars. Cars with burned or battered bodies and broken wheels; cars with shot transmissions and useless brakes; cars in every imaginable form of disrepair. From among these disconsolate veterans resident in the local auto graveyard it will be possible to select one, preferably a light car, which has the prime requisites for converting it into a trim aero driven ice plane.

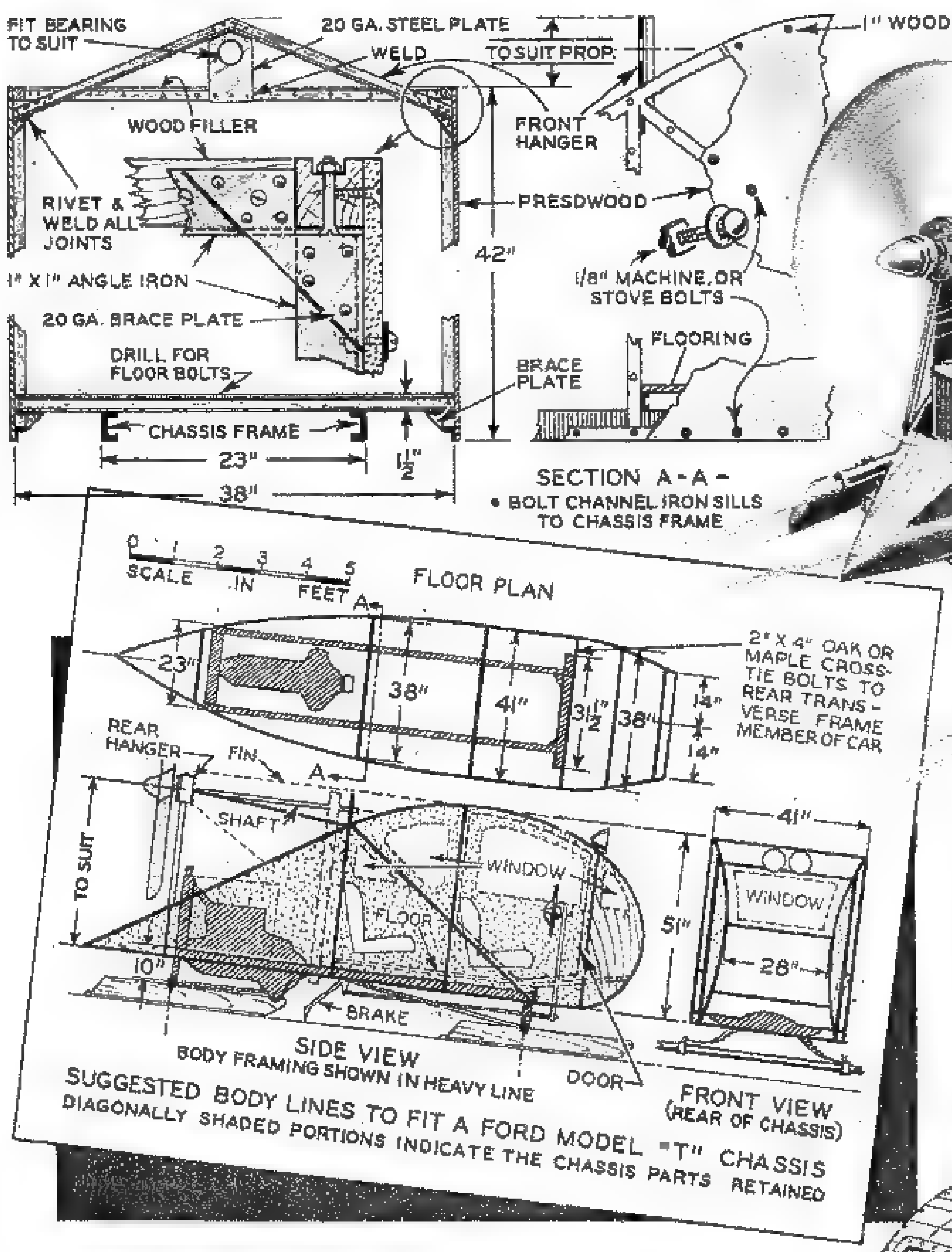
The requirements are as few as they are simple. First, a sound and unwarped chassis. Secondly, a motor which even if not exactly in good condition is yet able to run. Unless a motor is too hopelessly worn out a little patience and some judicial overhauling will result in a quite satisfactory power plant for the purpose intended.

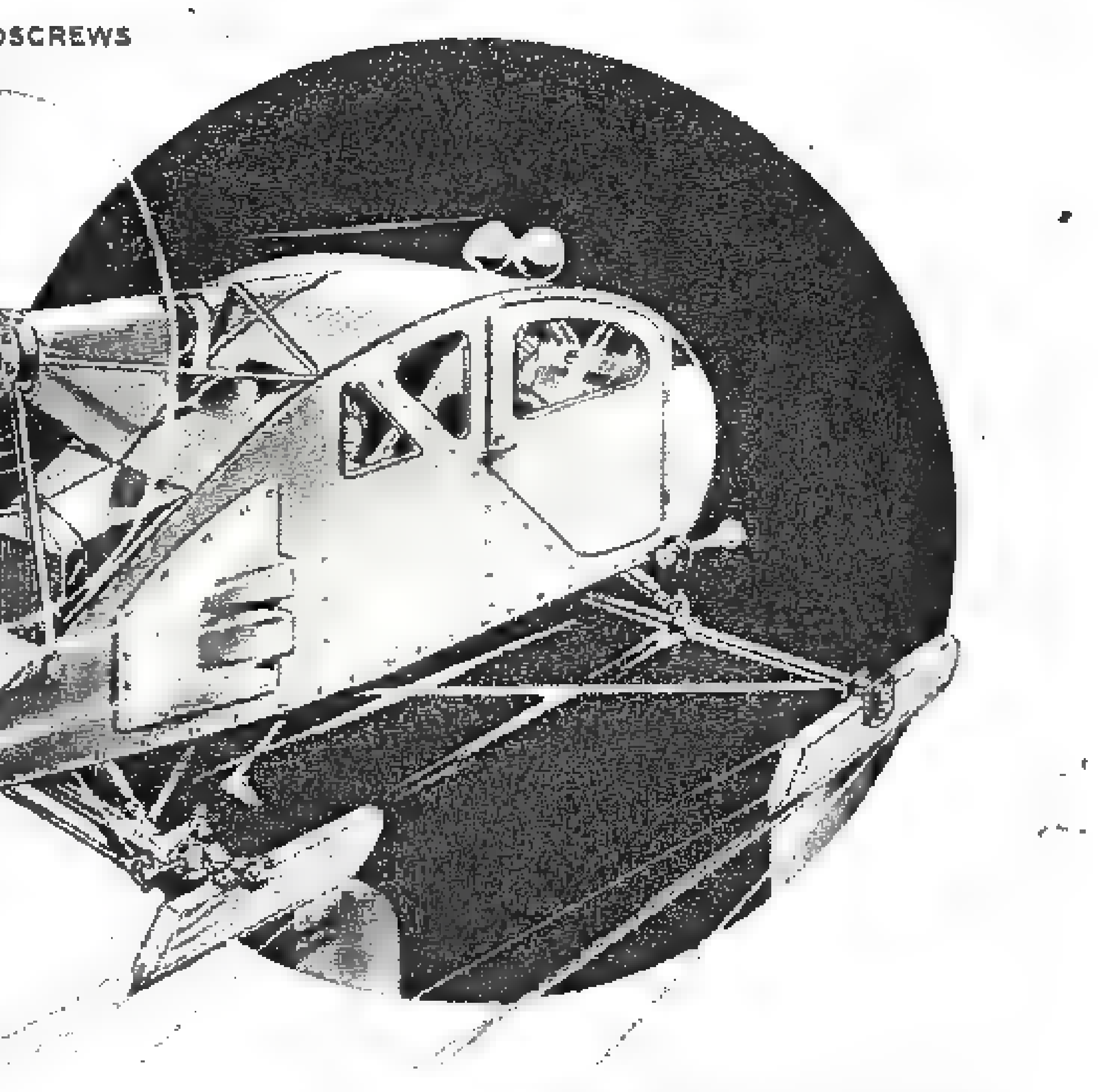
Assuming that you have picked out a car having these two essential factors you can start dickering with the owner. There are a good many parts you won't need at all so bear this in mind when making the deal. For instance: The body, fenders, the entire transmission, back axle and rear wheels are entirely unnecessary for your plans and are only so much extra junk for you to cart away. By leaving them on the spot you will undoubtedly be able to strike a better bargain.

The front wheels and the steering wheel are needed for purposes we shall presently discover and you will also want the starter; in fact, all the parts pertaining to the operation of the motor itself. The battery is likely to be missing or at best useless so you can make up your mind that here is one item that will have to be included in the moderate amount of new material the conversion requires.

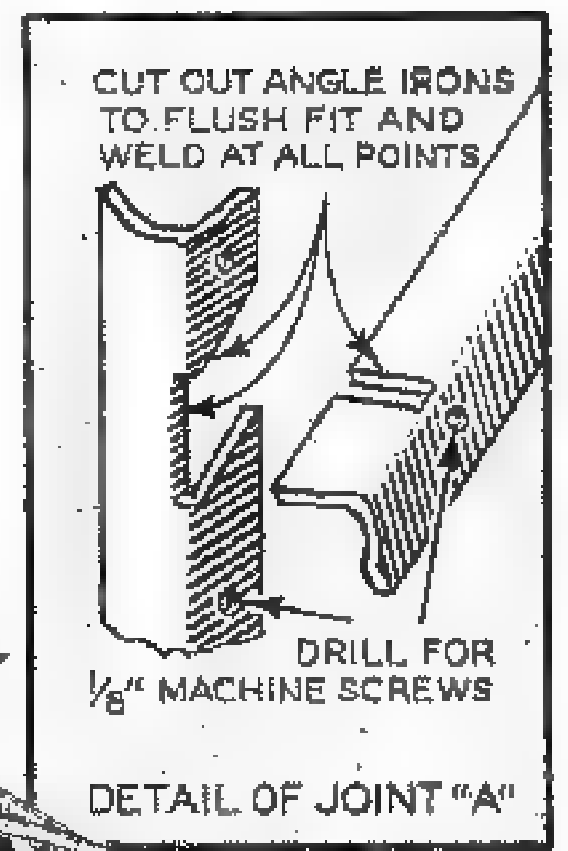
Strip the car down to the bare chassis unless you have already bought it in this condition. If the motor seems to need some tinkering, now is the time to do it. A good top overhaul will work wonders with any motor so get this little job off your mind and satisfy yourself that the motor is in reasonably good working condition before proceeding with the actual conversion.

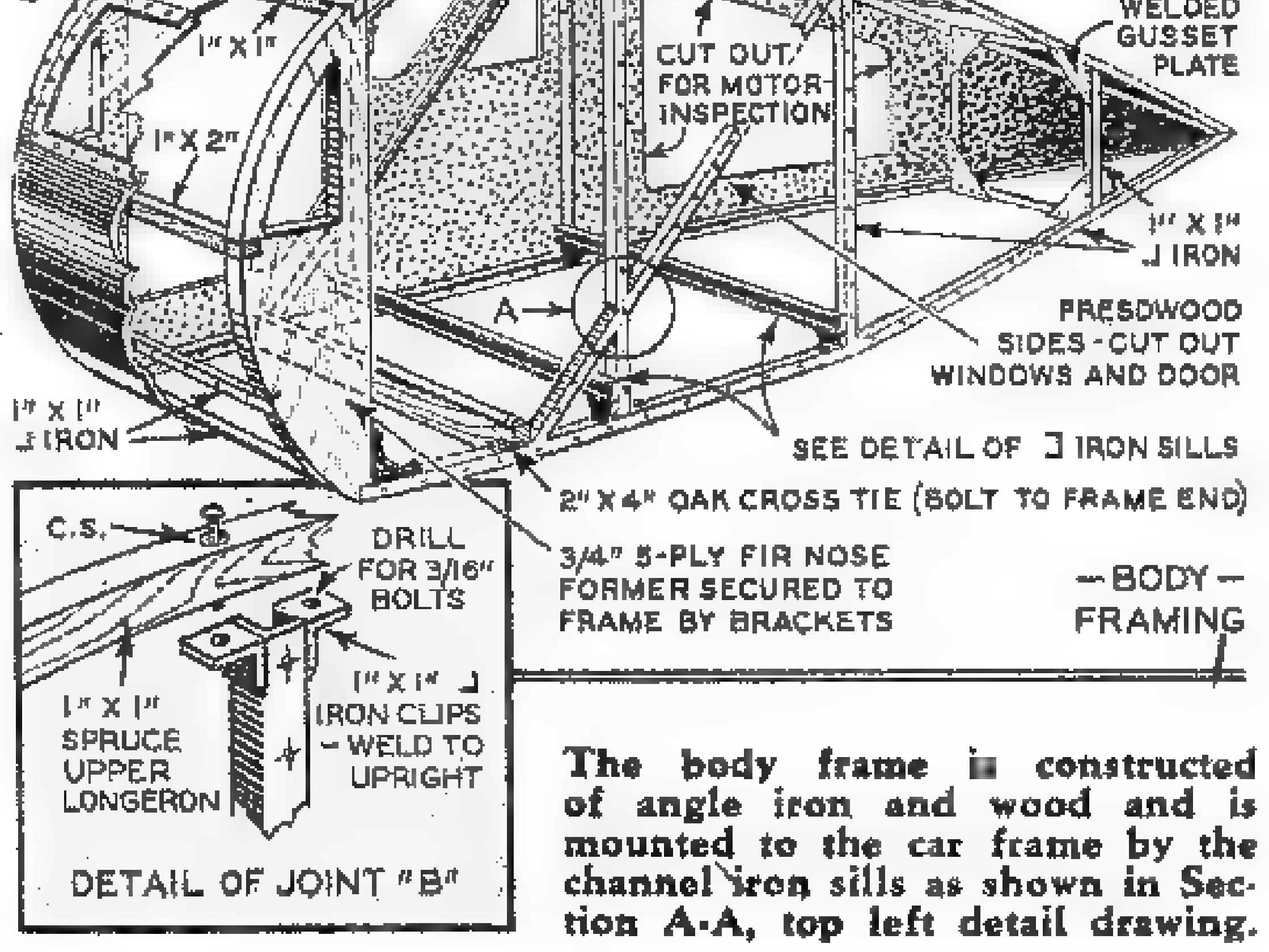
With the motor in shape remove all wiring from the dash board and the steering gear as far as the steering tie rod which is left intact.


FIT BEARING TO SUIT
20 GA. STEEL PLATE
WELD
TO SUIT PROP.
1" WOODSCREWS
WOOD FILLER
FRONT HANGER
RIVET & WELD ALL JOINTS
PRESDWOOD
42"
1" X 1" ANGLE IRON
1/8" MACHINE OR STOVE BOLTS
20 GA. BRACE PLATE
FLOORING
DRILL FOR FLOOR BOLTS
BRACE PLATE
CHASSIS FRAME
23"
$1\frac{1}{2}$"
38"
SECTION A-A-
• BOLT CHANNEL IRON SILLS TO CHASSIS FRAME
0 1 2 3 4 5
SCALE IN FEET
FLOOR PLAN
A
23"
38"
41"
$31\frac{1}{2}$"
38"
14"
14"
2" X 4" OAK OR MAPLE CROSS-TIE BOLTS TO REAR TRANSVERSE FRAME MEMBER OF CAR
REAR HANGER
FIN
A
SHAFT
TO SUIT
WINDOW
FLOOR
10"
BRAKE
51"
41"
WINDOW
28"
SIDE VIEW
BODY FRAMING SHOWN IN HEAVY LINE
DOOR
FRONT VIEW (REAR OF CHASSIS)
SUGGESTED BODY LINES TO FIT A FORD MODEL "T" CHASSIS
DIAGONALLY SHADED PORTIONS INDICATE THE CHASSIS PARTS RETAINED



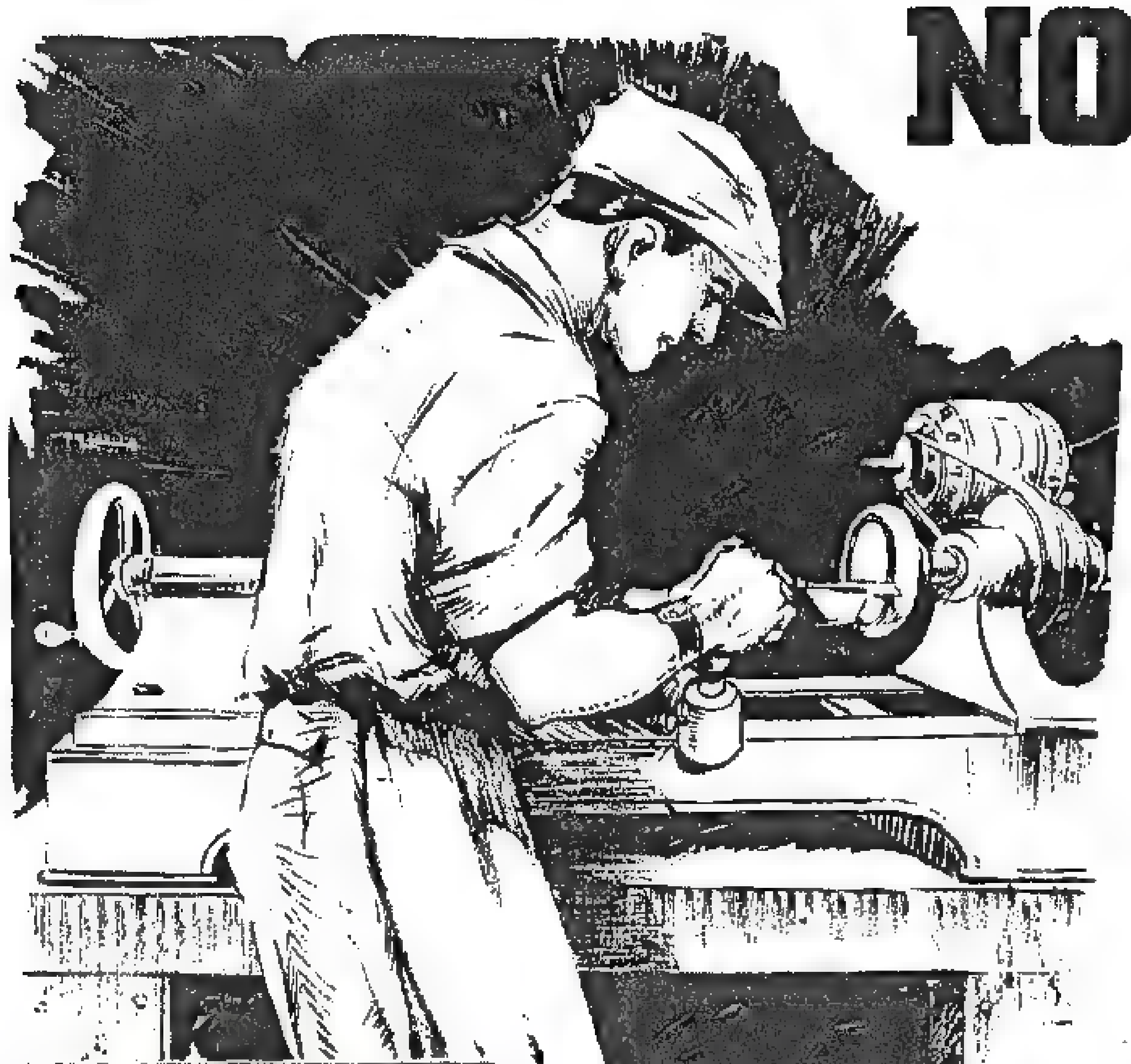
Above—View of the suggested sled showing drive taken from a belt pulley fitted behind the transmission housing. Details of drive pulleys, shaft hanger and rear bearing are similar to those used for "Polar Queen", described in the 1936 *How to Build It*.

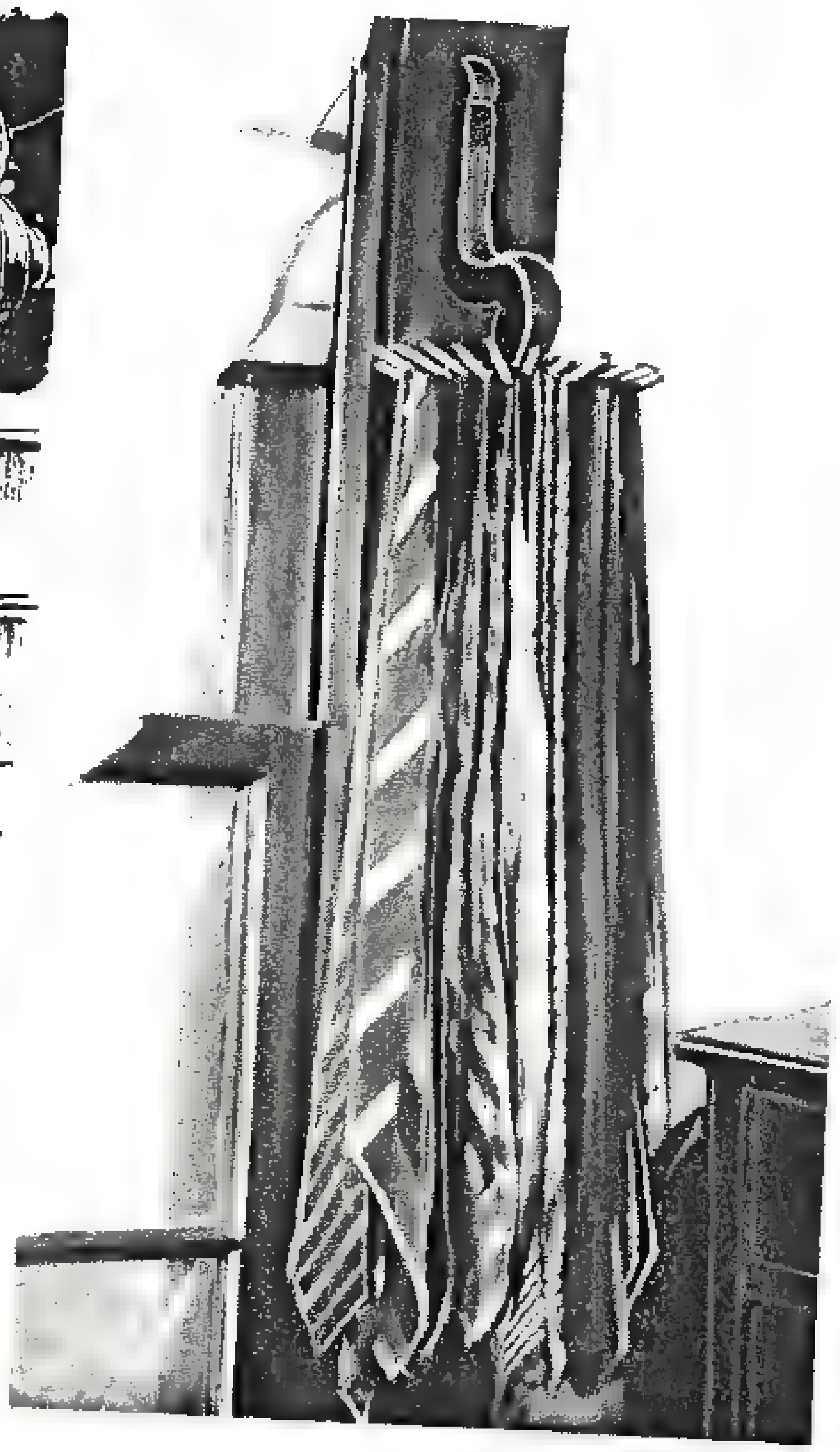

CUT OUT ANGLE IRONS TO FLUSH FIT AND WELD AT ALL POINTS
DRILL FOR 1/8" MACHINE SCREWS
DETAIL OF JOINT "A"

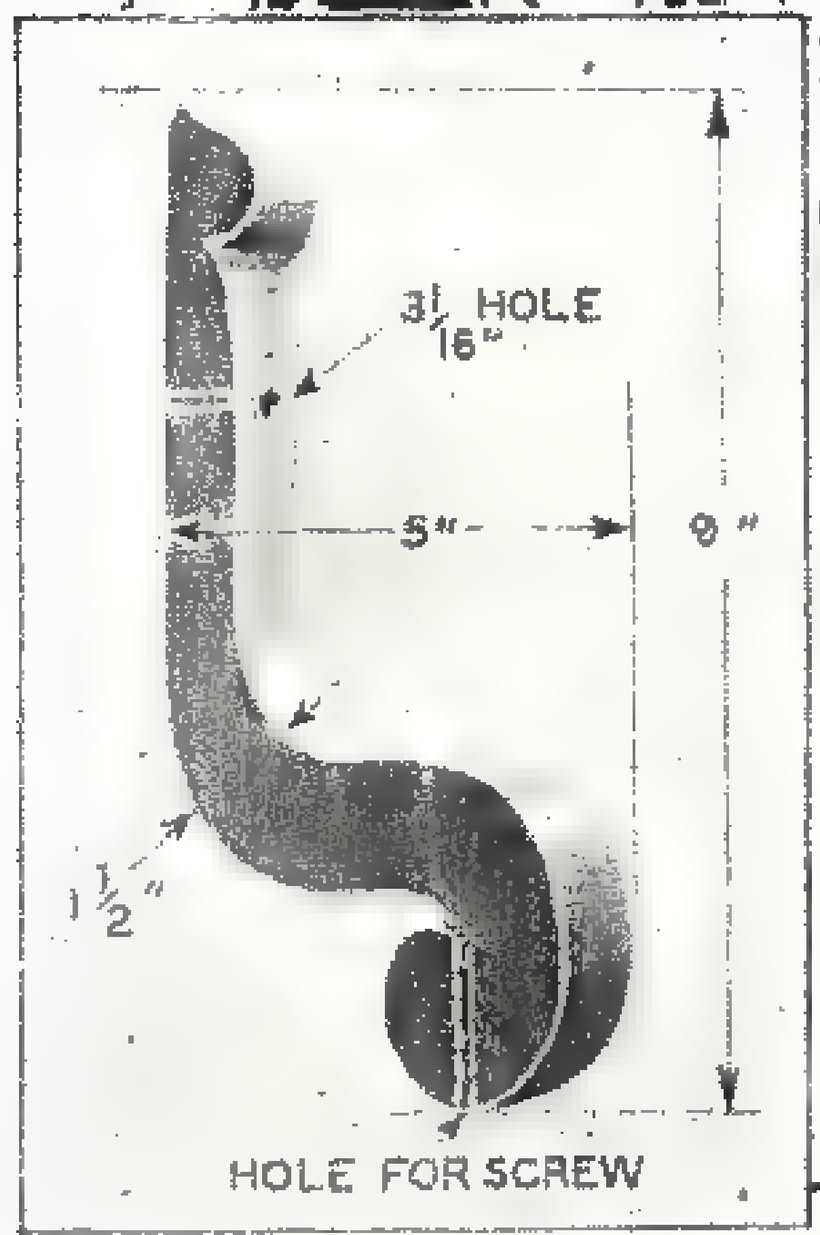

PLYWOOD OR SHEET METAL COVERING
SEE DETAIL -SECTION A-A-
B
1" X 1"
1" X 2"
CUT OUT FOR MOTOR INSPECTION
WELDED GUSSET PLATE
1" X 1" ⅃ IRON
A
PRESDWOOD SIDES - CUT OUT WINDOWS AND DOOR
1" X 1" ⅃ IRON
SEE DETAIL OF ⊐ IRON SILLS
2" X 4" OAK CROSS TIE (BOLT TO FRAME END)
3/4" 5-PLY FIR NOSE FORMER SECURED TO FRAME BY BRACKETS
— BODY — FRAMING
C.S.
DRILL FOR 3/16" BOLTS
1" X 1" ⅃ IRON CLIPS - WELD TO UPRIGHT
1" X 1" SPRUCE UPPER LONGERON
DETAIL OF JOINT "B"

The body frame is constructed of angle iron and wood and is mounted to the car frame by the channel iron sills as shown in Section A-A, top left detail drawing.

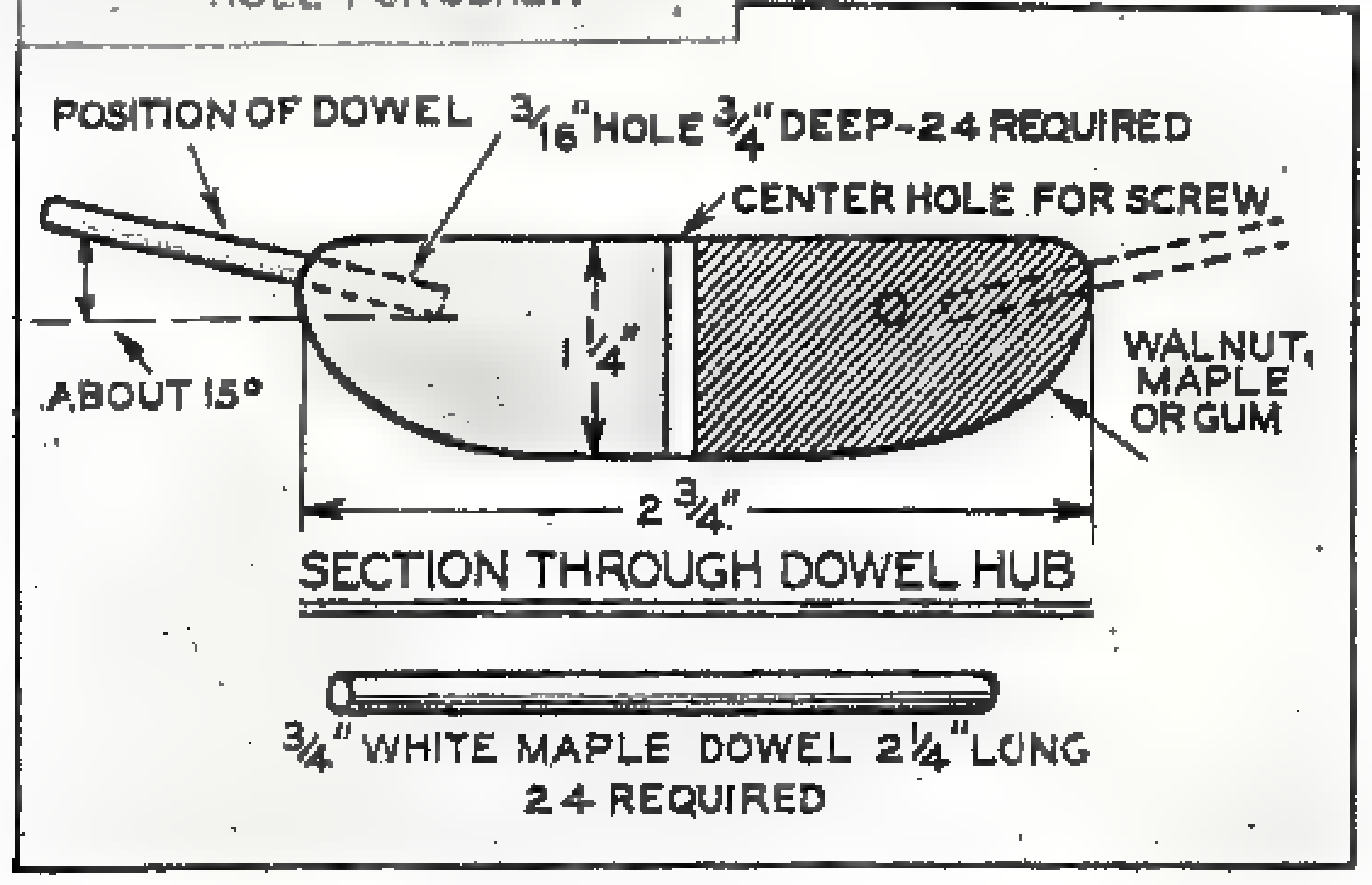
NOVELTIES IN WOOD






3/16" HOLE
5"
9"
1 1/2"
HOLE FOR SCREW

This attractive tie rack provides a convenient place for hanging 24 neckties for selection at random. The rack consists of a revolving hub to which are attached wooden dowels. A scrolled bracket permits rack to be fastened to wall.

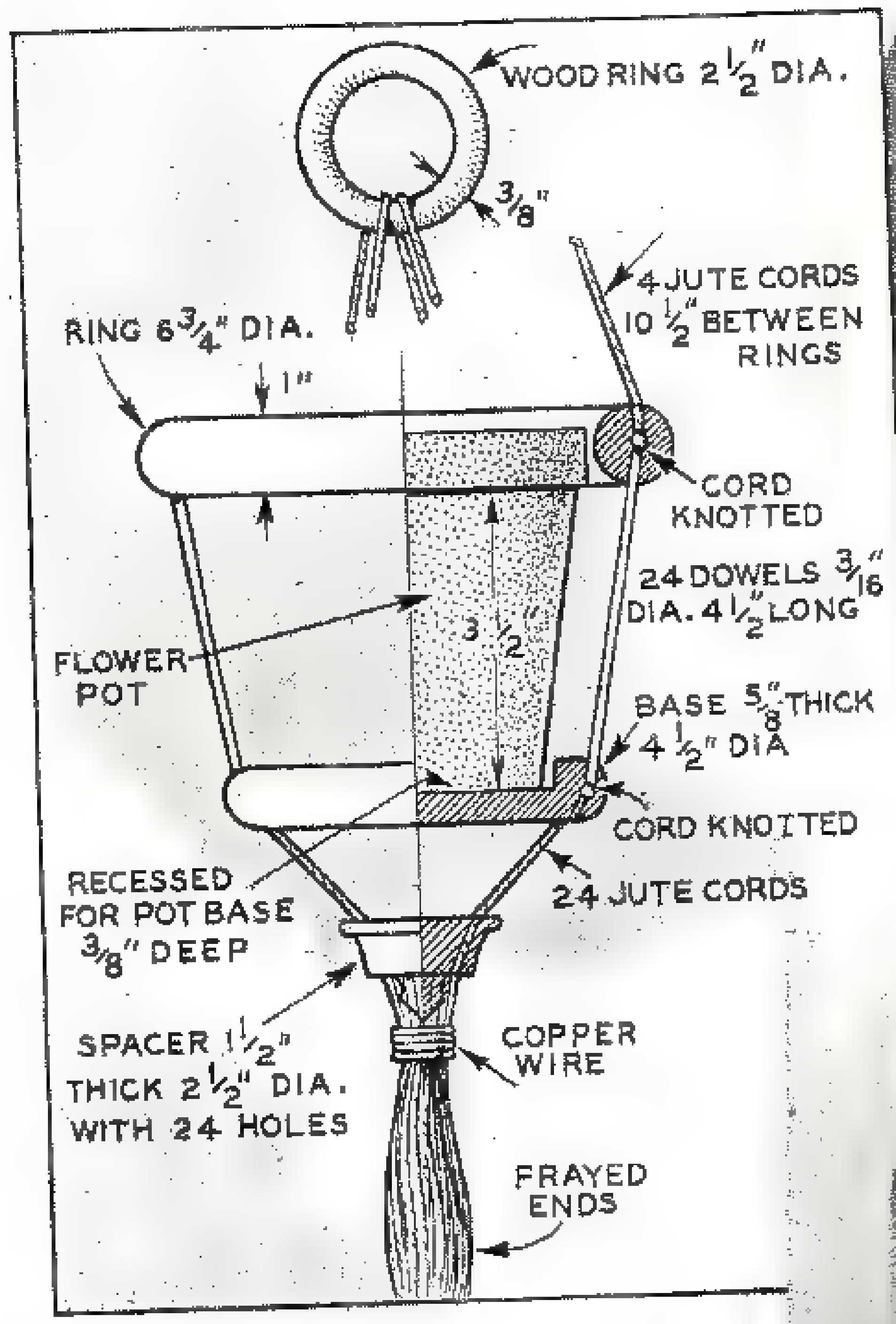

POSITION OF DOWEL
3/16" HOLE 3/4" DEEP-24 REQUIRED
CENTER HOLE FOR SCREW
ABOUT 15°
1 1/4"
WALNUT, MAPLE OR GUM
2 3/4"
SECTION THROUGH DOWEL HUB
3/4" WHITE MAPLE DOWEL 2 1/4" LONG
24 REQUIRED

by Dale R. Van Horn

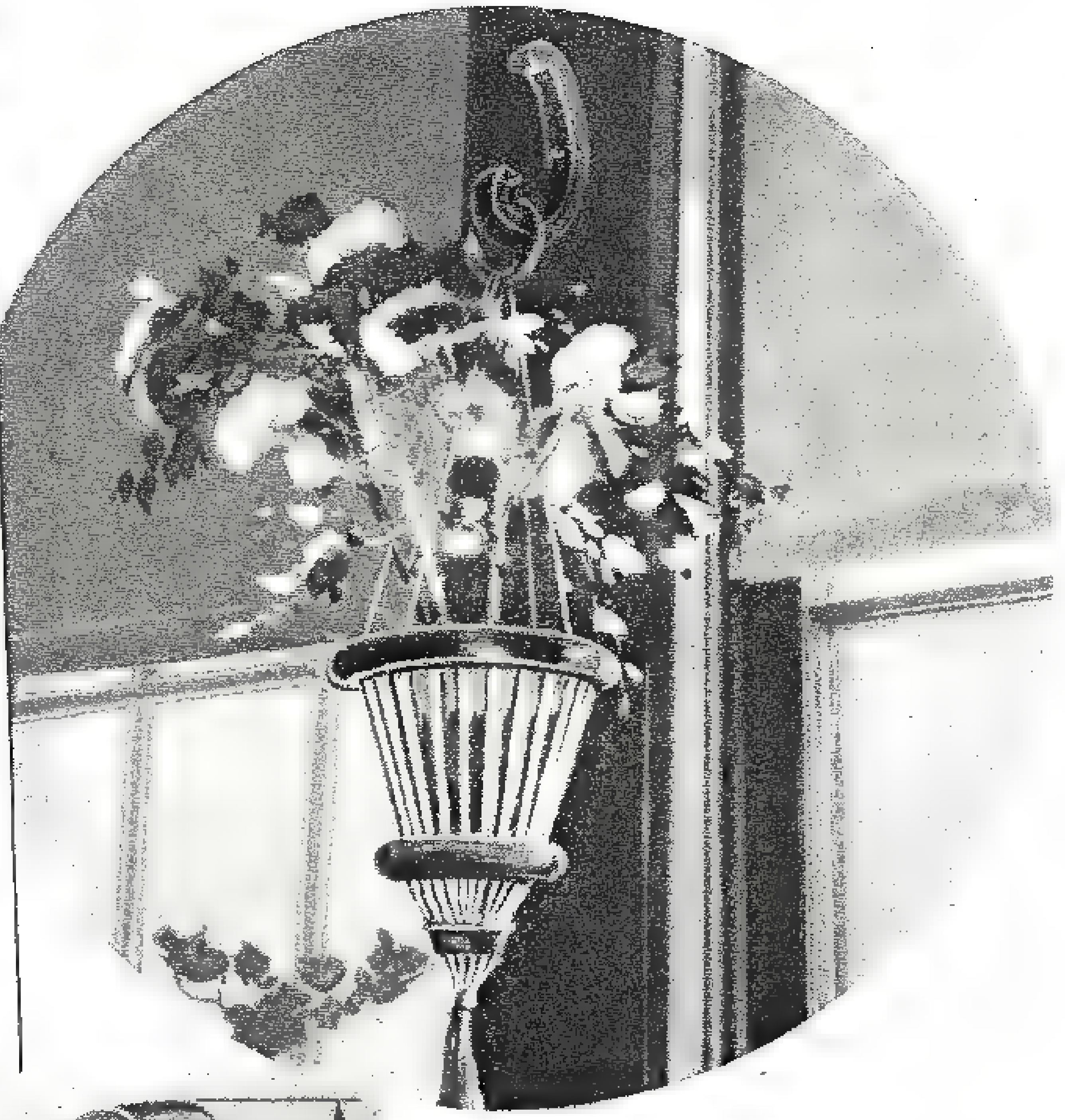
THESE simple woodworking projects were designed simply to make use of the assortment of scrap stock that eventually collects in the home workshop. Any one of them can be completed in a single evening if ambitiously tackled or in two evenings if a shorter period of time is spent on their construction.

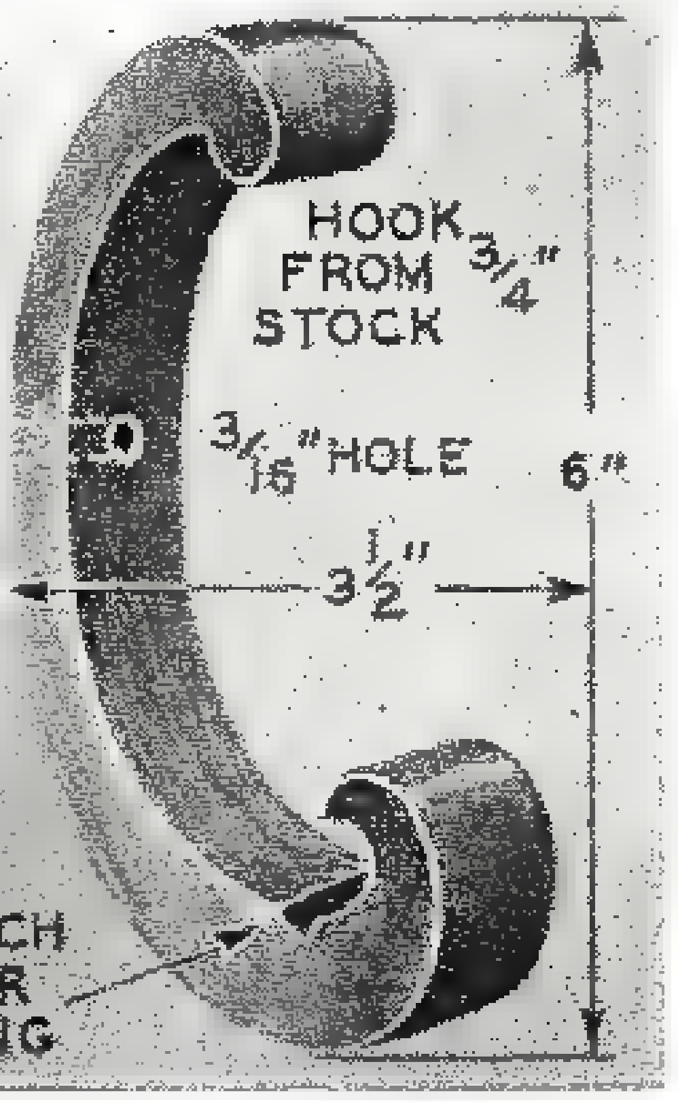
If you own a wood turning lathe a piece of scrap walnut or figured gum can be transformed into a unique tie rack that will hold 24 ties for prompt selection. The rack consists of a turned hub from which projects 24 spokes. The hub is attached to the wall by a single screw mounting bracket and revolves so that any tie can be selected in the same manner as clothing is selected from a revolving display rack.

By referring to the accompanying diagrams no difficulties in construction will be encountered. Turn down the hub to a diameter of 2¾ inches then drill 24 holes at equal intervals large enough to take the $\frac{3}{16}$-inch dowels. Last cut out the wall bracket on a scroll or band saw to the shape indicated and finish the completed tie rack in a natural finish or enamel. A single screw holds it to the wall. A hanging plant basket containing an ivy vine will brighten up the corner of any room. A very attractive basket was created from several turned wood rings and a few yards of jute cord.


WOOD RING 2 1/2" DIA.
3/8"
4 JUTE CORDS 10 1/2" BETWEEN RINGS
RING 6 3/4" DIA.
1"
CORD KNOTTED
24 DOWELS 3/16" DIA. 4 1/2" LONG
3 1/2"
FLOWER POT
BASE 5/8" THICK 4 1/2" DIA
CORD KNOTTED
RECESSED FOR POT BASE 3/8" DEEP
24 JUTE CORDS
SPACER 1 1/2" THICK 2 1/2" DIA. WITH 24 HOLES
COPPER WIRE
FRAYED ENDS

Turned on a lathe from scrap pieces of gum this hanging plant basket proves a novel home decoration. The above diagram gives the cross-section details.




HOOK FROM STOCK 3/4"
3/16" HOLE
6"
3 1/2"
NOTCH FOR RING

The completed hanging basket is supported by a hook cut from ¾" stock. Follow the dimensions at left, cutting hook from walnut.

The rings are turned from 1-inch walnut or gum stock by attaching a squared block to the faceplate of the lathe, turning one-half and then reversing the block and completing the ring. Allow the center of the ring to remain as part of the ring itself until it is removed from the lathe. The center portion can be removed with a sharp knife. The lower and smaller ring is given only half the operation mentioned above. After turning the edge of the ring cut out the center recess to a depth of ⅜-inch. Drill 24 uniformly spaced holes through each ring for passing the cords. Knot these so that the rings do not shift their positions. Bring the cords together at the bottom of the basket through a 1½-inch spacer ring fraying the ends of the jute cord to provide a tassel effect.

Before threading the cord through the rings finish them in natural colors with a shellac or varnish for a lasting and durable surface.

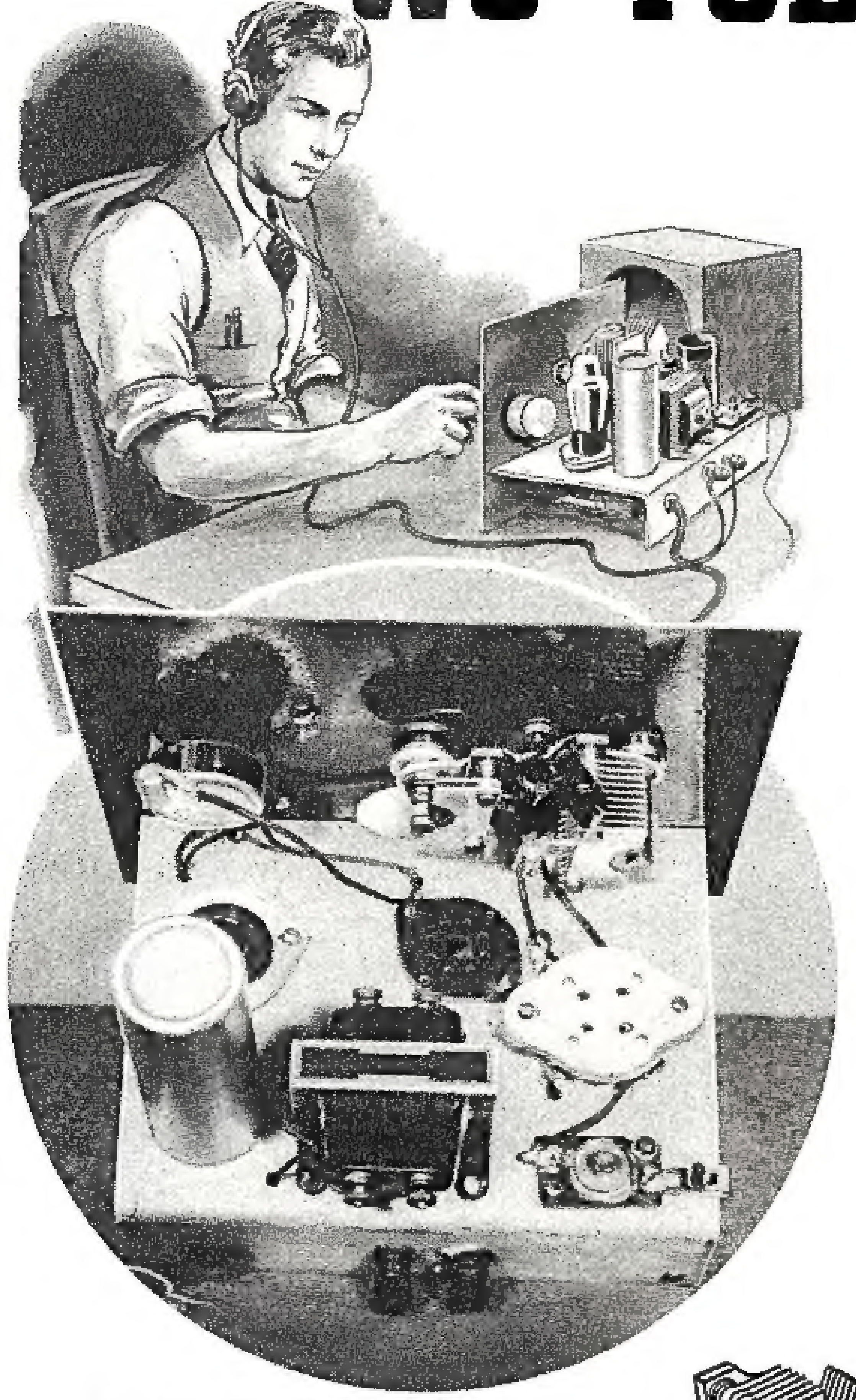
A dowel cigarette box is something that anyone with only a slight knowledge of woodworking can make. It consists merely of two discs, turned down on the lathe and drilled to receive 6¼-inch wood dowels. The top disc is cut in two sections to provide a lid effect. After the dowels have been glued in place and allowed to dry the cigarette box is finished in bright enamels or in natural colors. A sheet of colored celluloid may be inserted and cemented inside the dowel assembly to hide the lithographed printing on the vacuum tin in which the cigarettes are packed. These cigarette boxes make excellent bridge prizes or you can give them to friends as souvenirs from your workshop.

The last project to be described will interest every housewife who finds it necessary to do an occasional bit of mending. It provides a neat arrangement for storing scissors, thread and needles and can be made manufactured in the home workshop in a single evening. The base is turned from a 5-inch

TWO TUBE SET TUNES IN THE WORLD

by Stanley Johnson

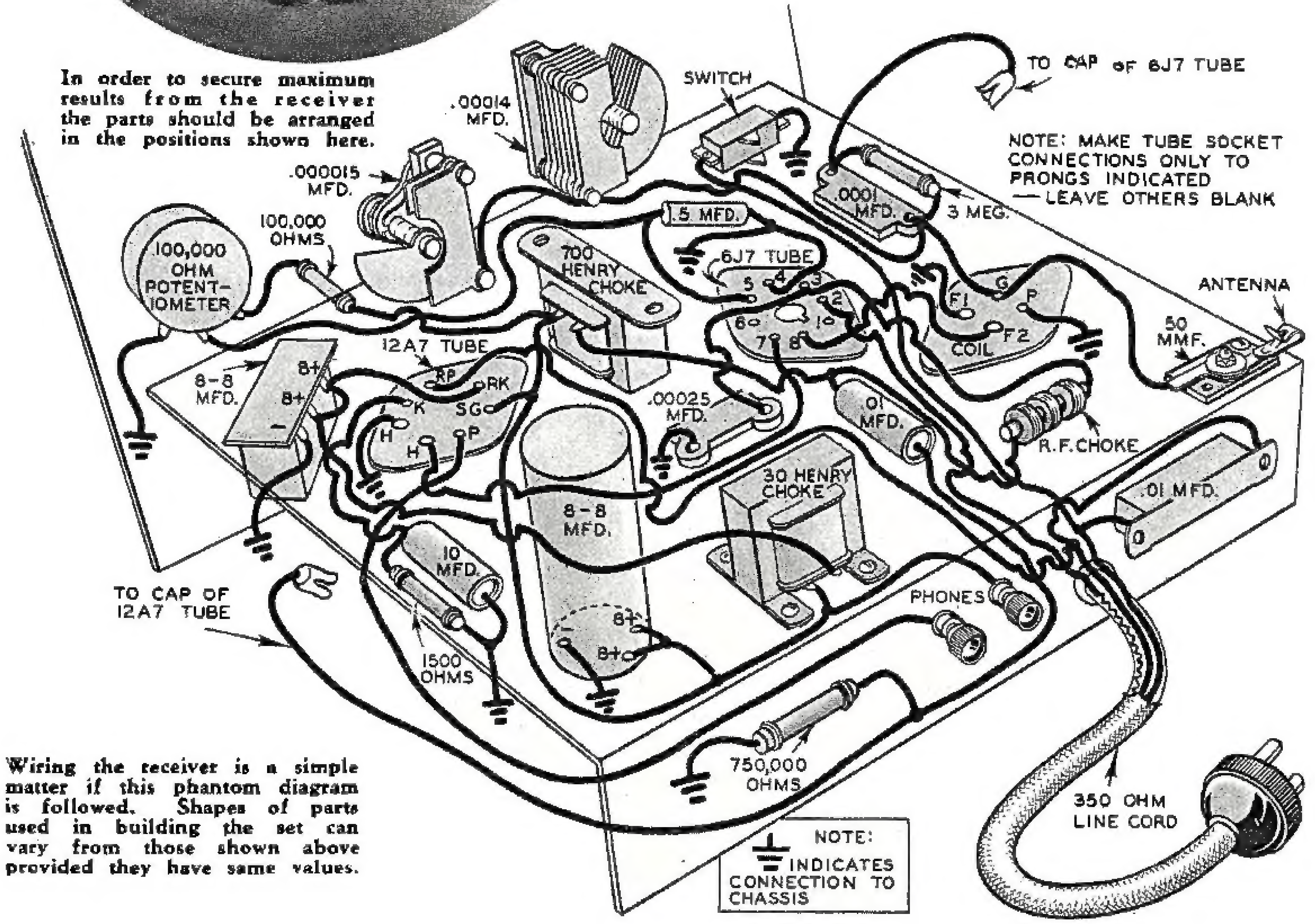
A metal and glass tube provides 3-tube performance for this all-electric set.



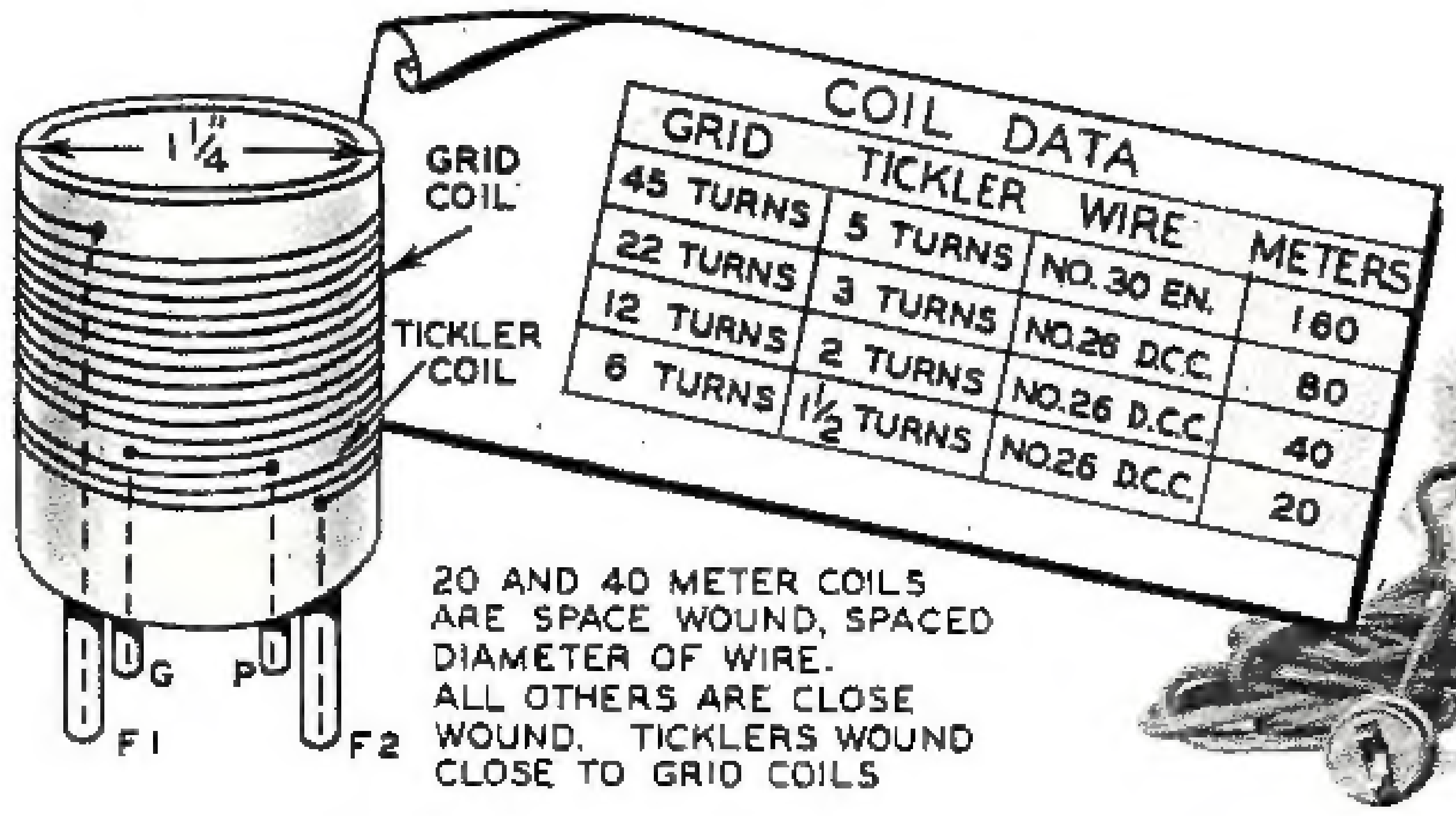
ONE metal and one dual-purpose glass tube are used in this compact receiver which will operate a speaker when tuned to many of the stations in the broadcast band and will give good headphone volume on the short waves. A novel AC-DC circuit, eliminating the need for extra power supplies, makes the receiver extremely flexible and allows its use wherever there is a power line. Strongly built and very compact, the set is readily portable and serves as an excellent "personal" radio.

The metal type 6J7 tube serves as a quiet and very sensitive electron coupled detector. This detector circuit has seen almost universal acceptance in the design of metal tube regenerative sets because of its inherent stability and simplicity of coil design. The 6J7 is impedance coupled to a type 12A7 combination power-pentode and rectifier tube.

In order to secure maximum results from the receiver the parts should be arranged in the positions shown here.


.00014 MFD.
SWITCH
TO CAP OF 6J7 TUBE
NOTE: MAKE TUBE SOCKET CONNECTIONS ONLY TO PRONGS INDICATED — LEAVE OTHERS BLANK
.000015 MFD.
100,000 OHMS
100,000 OHM POTENTIOMETER
.5 MFD.
.0001 MFD.
3 MEG.
700 HENRY CHOKE
6J7 TUBE
5
4
3
2
1
6
7
8
F1
G
P
F2
COIL
ANTENNA
50 MMF.
12A7 TUBE
RP
RK
K
SG
H
H
P
8-8 MFD.
8+
8+
.00025 MFD.
.01 MFD.
R.F. CHOKE
30 HENRY CHOKE
.01 MFD.
8-8 MFD.
10 MFD.
TO CAP OF 12A7 TUBE
PHONES
1500 OHMS
8+
8+
750,000 OHMS
350 OHM LINE CORD
NOTE: INDICATES CONNECTION TO CHASSIS

Wiring the receiver is a simple matter if this phantom diagram is followed. Shapes of parts used in building the set can vary from those shown above provided they have same values.


1¼"
GRID COIL
TICKLER COIL
G
P
F1
F2

COIL DATA

GRID	TICKLER	WIRE	METERS
45 TURNS	5 TURNS	NO. 30 EN.	160
22 TURNS	3 TURNS	NO.26 D.C.C.	80
12 TURNS	2 TURNS	NO.26 D.C.C.	40
6 TURNS	1½ TURNS	NO.26 D.C.C.	20

20 AND 40 METER COILS ARE SPACE WOUND, SPACED DIAMETER OF WIRE. ALL OTHERS ARE CLOSE WOUND. TICKLERS WOUND CLOSE TO GRID COILS

The coils for the various wavelengths may be wound on 4-prong tube bases if commercial coils are not available. If the set fails to oscillate reverse the coil leads P and F-2.

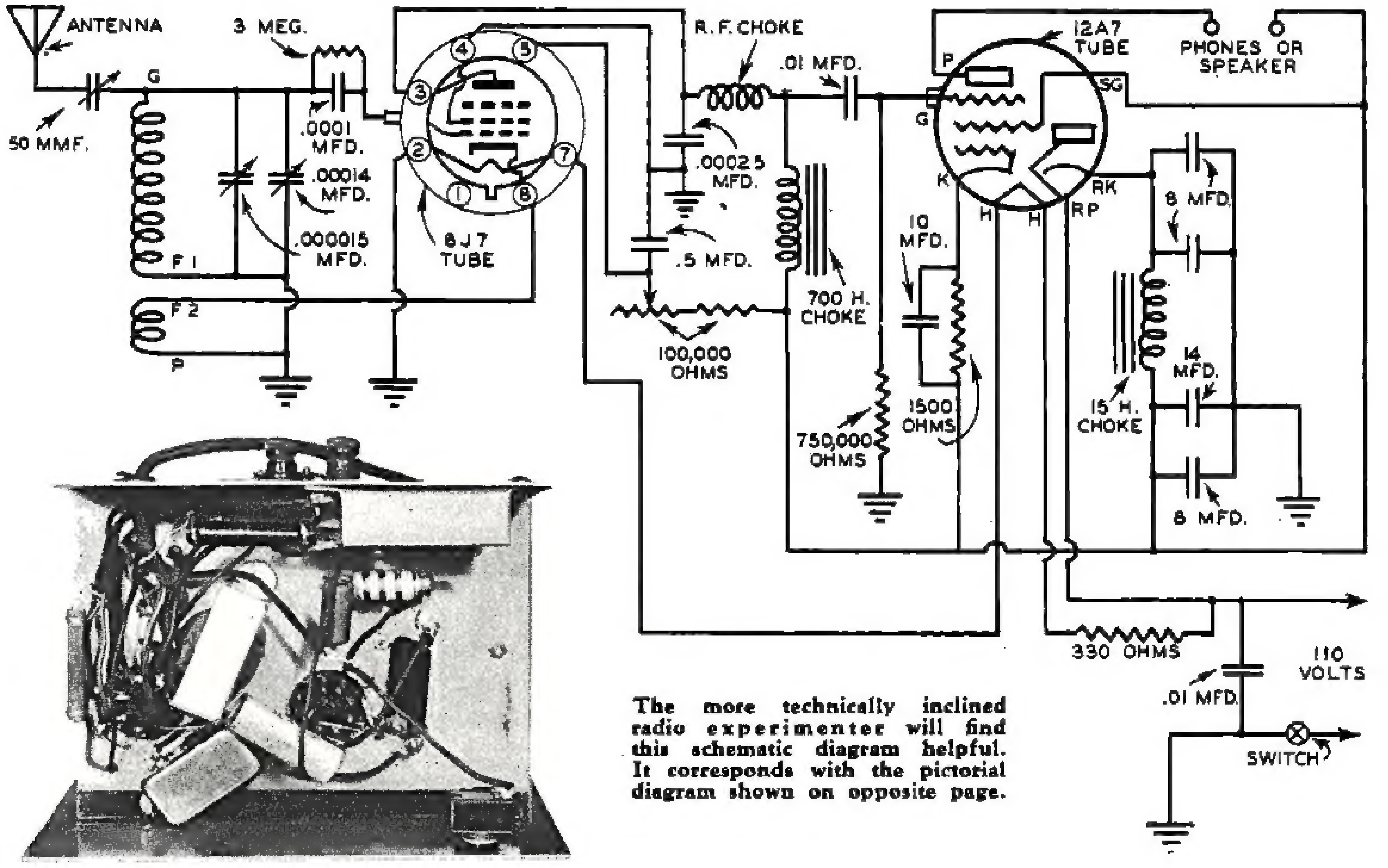
The 12A7 is capable of good audio output and its use allows three-tube performance with only two tubes.

The parts are mounted on a metal chassis which consists of a 7x8-inch black crackle finished metal panel and a 2x5½x7-inch aluminum base. Since this set is to be used on the short wave bands as well as the broadcast band, placement of parts is important and for that reason the builder should follow the layout arrangement shown. Fractions of an inch do not matter; the important thing is to follow the same general arrangement.

Looking down on the set we see the tuning condensers and the volume control mounted on the panel. On the base, the coil socket is mounted directly behind the variable condensers, with the tube sockets to one side. At the back of the base is the coupling choke, the multiple electrolytic condensers and the antenna trimming condenser. The filter choke, the metal cased by-pass condenser and miscellaneous small resistors and condensers are mounted underneath the base.

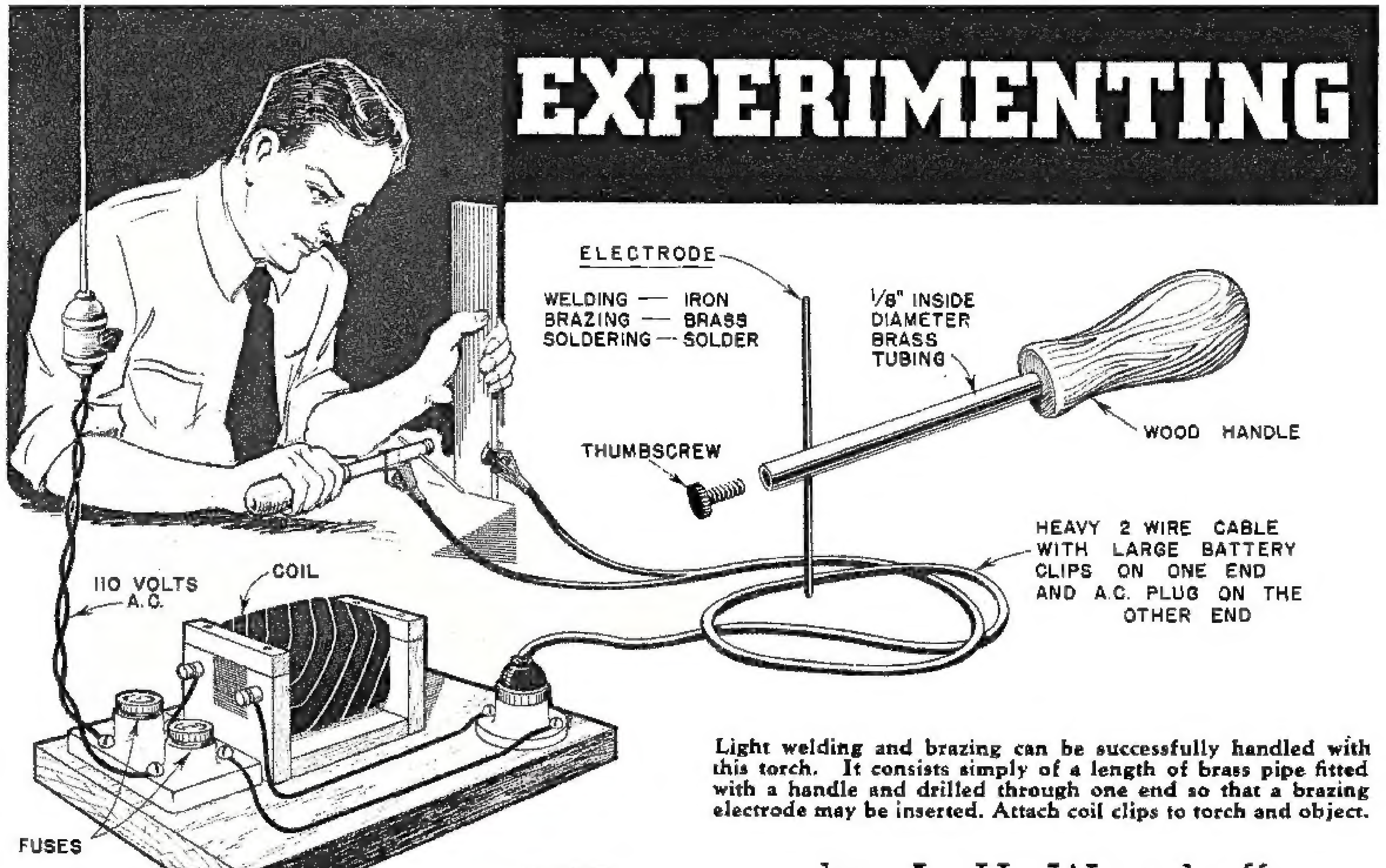
Careful wiring is important to insure good results. Tuning leads should be short and stiff and all "ground" connections in the de-

[*Continued on page* 134]


ANTENNA
50 MMF.
G
3 MEG.
.0001 MFD.
.00014 MFD.
.000015 MFD.
F1
F2
P
6J7 TUBE
R.F. CHOKE
.01 MFD.
.00025 MFD.
.5 MFD.
100,000 OHMS
700 H. CHOKE
10 MFD.
1500 OHMS
750,000 OHMS
12A7 TUBE
P
SG
G
K
H
H
RK
RP
PHONES OR SPEAKER
8 MFD.
14 MFD.
15 H. CHOKE
8 MFD.
330 OHMS
.01 MFD.
110 VOLTS
SWITCH

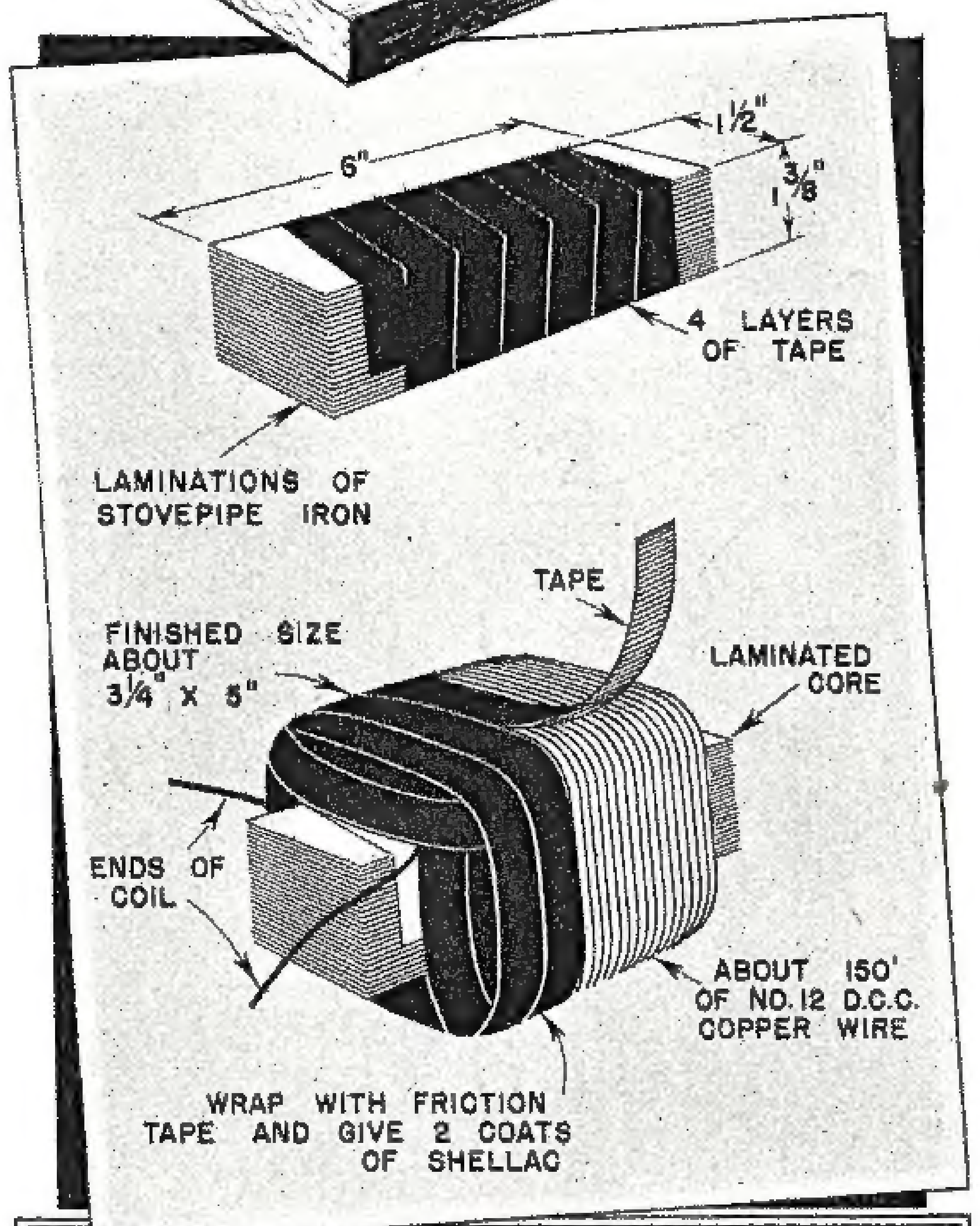
The more technically inclined radio experimenter will find this schematic diagram helpful. It corresponds with the pictorial diagram shown on opposite page.

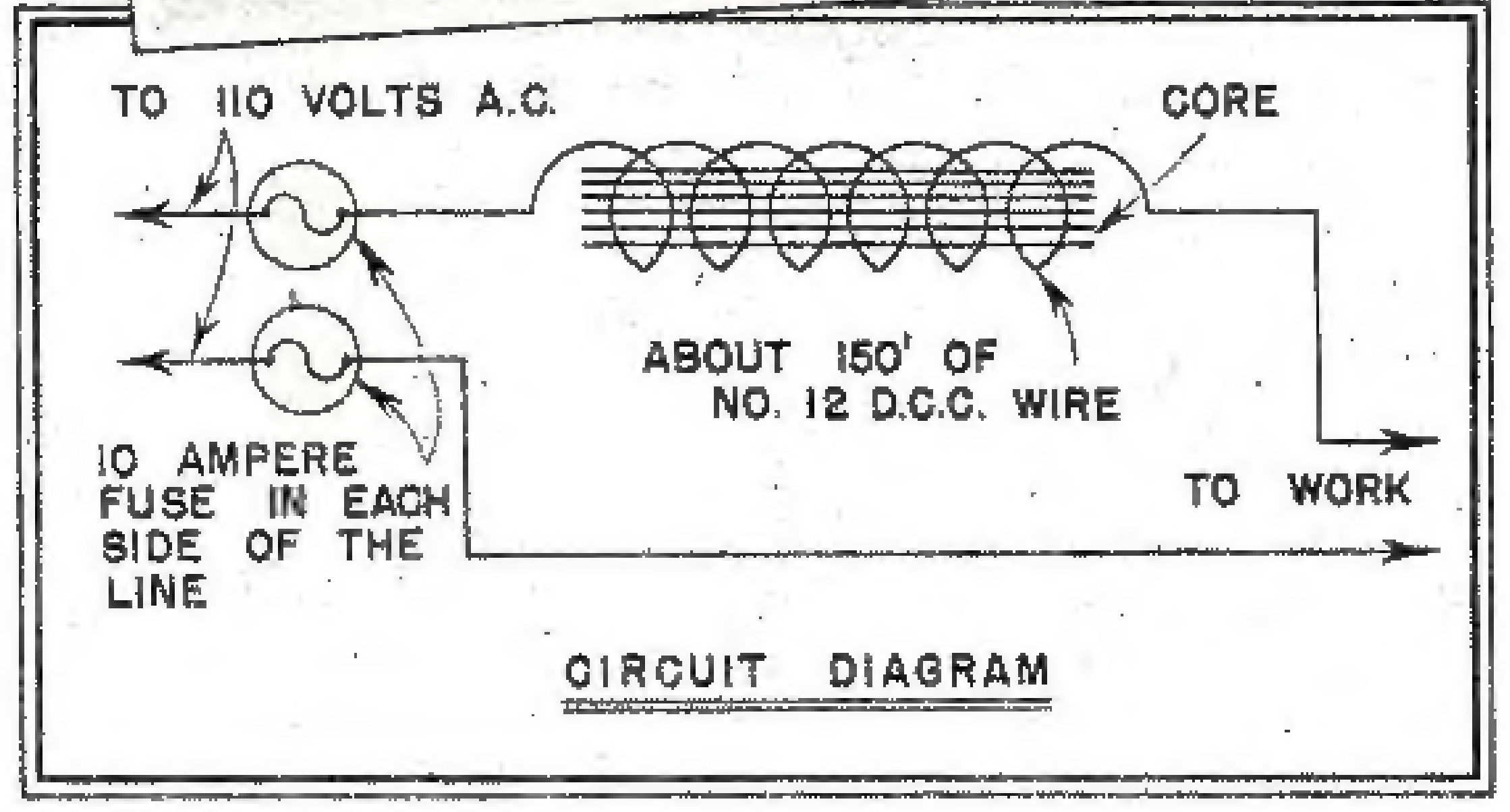
EXPERIMENTING WITH A REACTANCE COIL


ELECTRODE
WELDING — IRON
BRAZING — BRASS
SOLDERING — SOLDER
1/8" INSIDE DIAMETER BRASS TUBING
WOOD HANDLE
THUMBSCREW
HEAVY 2 WIRE CABLE WITH LARGE BATTERY CLIPS ON ONE END AND A.C. PLUG ON THE OTHER END
110 VOLTS A.C.
COIL
FUSES

Light welding and brazing can be successfully handled with this torch. It consists simply of a length of brass pipe fitted with a handle and drilled through one end so that a brazing electrode may be inserted. Attach coil clips to torch and object.

by A. H. Waychoff


6"
1/2"
1 3/8"
4 LAYERS OF TAPE
LAMINATIONS OF STOVEPIPE IRON
TAPE
FINISHED SIZE ABOUT 3¼" x 5"
LAMINATED CORE
ENDS OF COIL
ABOUT 150' OF NO. 12 D.C.C. COPPER WIRE
WRAP WITH FRICTION TAPE AND GIVE 2 COATS OF SHELLAC


TO 110 VOLTS A.C.
CORE
ABOUT 150' OF NO. 12 D.C.C. WIRE
10 AMPERE FUSE IN EACH SIDE OF THE LINE
TO WORK
CIRCUIT DIAGRAM

The reactance coil is wound on a metal laminated core consisting of sixty to seventy 1½" x 6" strips of stovepipe iron. Over coil wind tape, following with 150′ winding of No. 12 D.C.C. magnet wire. Schematic diagram of the coil is shown at left.

EXPERIMENTING with black light, electric arc welding and molten metals are only a few of the many interesting experiments which you can perform if you own a reactance coil. The reactance coil, itself, is a simple piece of electrical apparatus which serves as an automatic current consumer permitting an electric arc to be produced from 110-volt house current without the usual blowing of fuses. Instead of the arcs producing a perfect short circuit as would be the case if connected directly to the 110-volt they are merely part of the series resistance circuit into which the reactance coil has been connected.

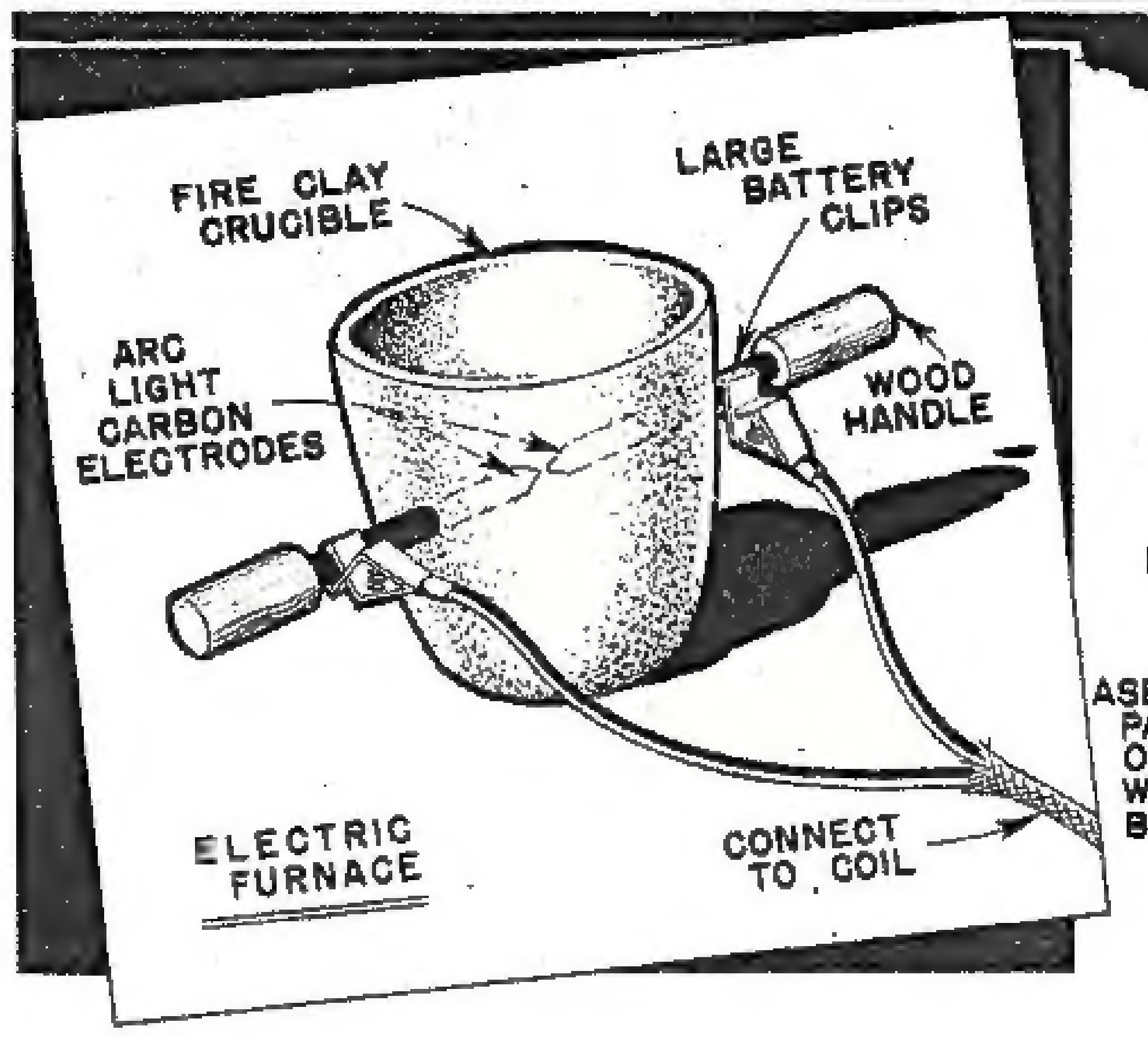
Before any experiments can be conducted it will be first necessary to construct the coil. Secure a sheet of black iron, commonly referred to as stovepipe iron and cut it into strips measuring 6″ by 1½″. Stack these up until the pile measures 1⅜″ in thickness. About sixty to seventy strips will be required. Around the pile of iron strips wrap four layers of friction tape. The bound strips become the core for the reactance coil.

With the core completed you are ready to wind the coil. This consists of 150 feet of No. 12 double cotton covered copper wire. Wind the wire over the metal core in uniform layers then bind the coil with several layers of friction tape. To seal the coil from moisture paint it with several coats of shellac, but be careful not to paint the core or metal strips on which the coil is wound.

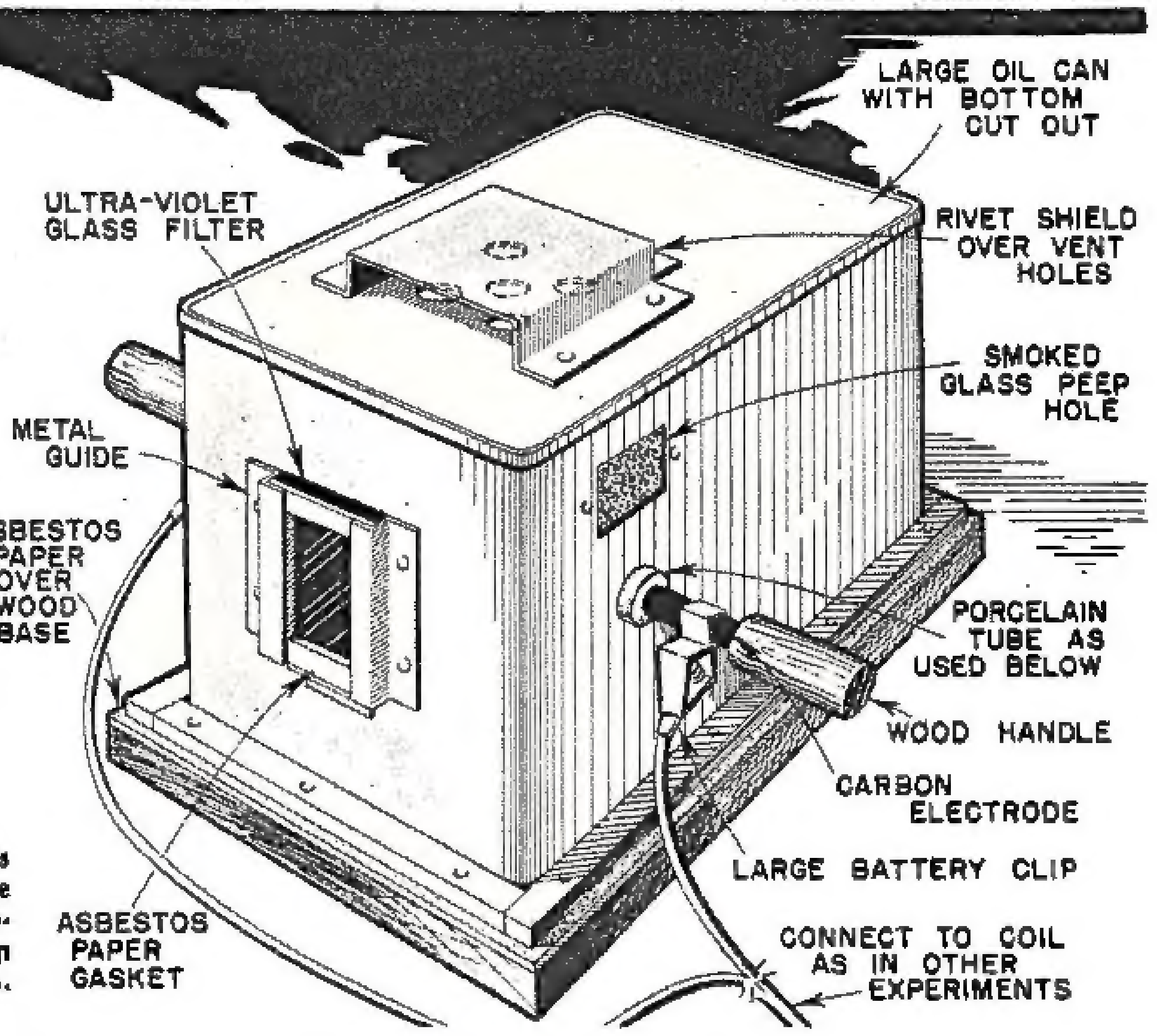
After the shellac has dried the coil can be mounted on a suitable wooden base along with a double fuse block which provides for the installation of two 10 ampere fuses. These provide additional overload safety when using the coil. A porcelain cleat socket is also attached to the base permitting a flexible heavy duty rubber covered fixture cord to be attached. Battery clips attached to the opposite ends of the cable allows connections to be made to the carbon electrodes.

Connected to a welding torch the reactance coil permits anyone to do light brazing, soldering or welding. A satisfactory welding torch can be made from a length of brass tubing having an inside diameter of ⅛″. A hole is drilled through the end of the coil for the brazing electrodes. A thumbscrew holds the electrodes securely in place. A large wooden file handle attached to the opposite end of the tubing completes the torch. To use simply connect one of the battery clips attached to the reactance coil cable to the torch and connect the other clip to the work to be welded. It is always advisable to wear

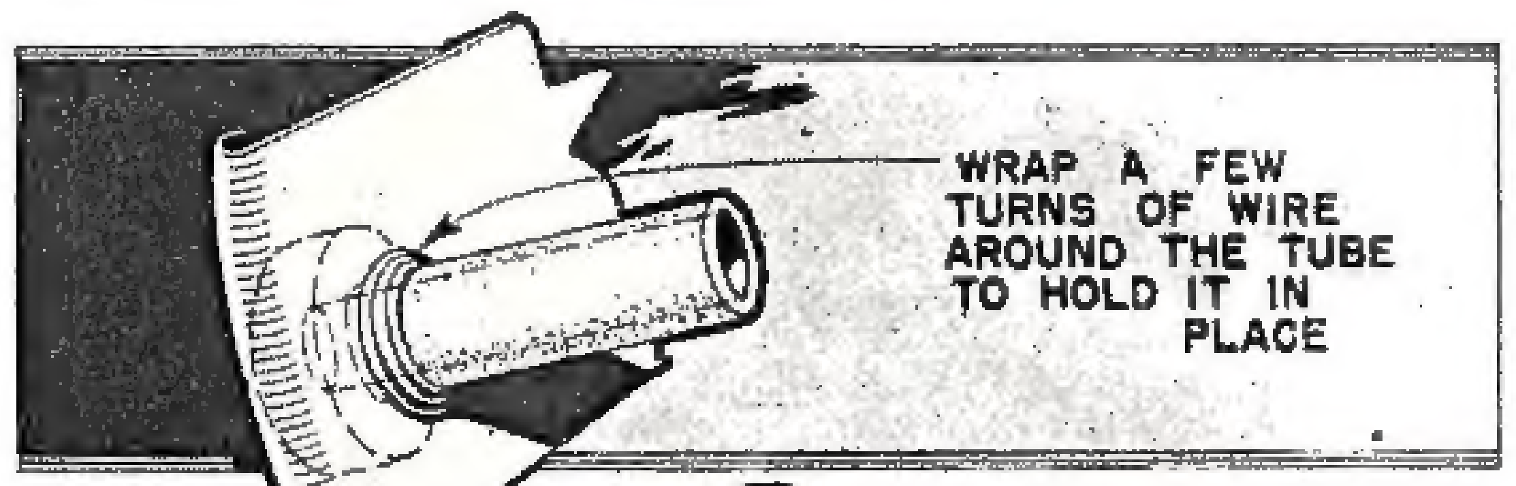
[Continued on page 134]

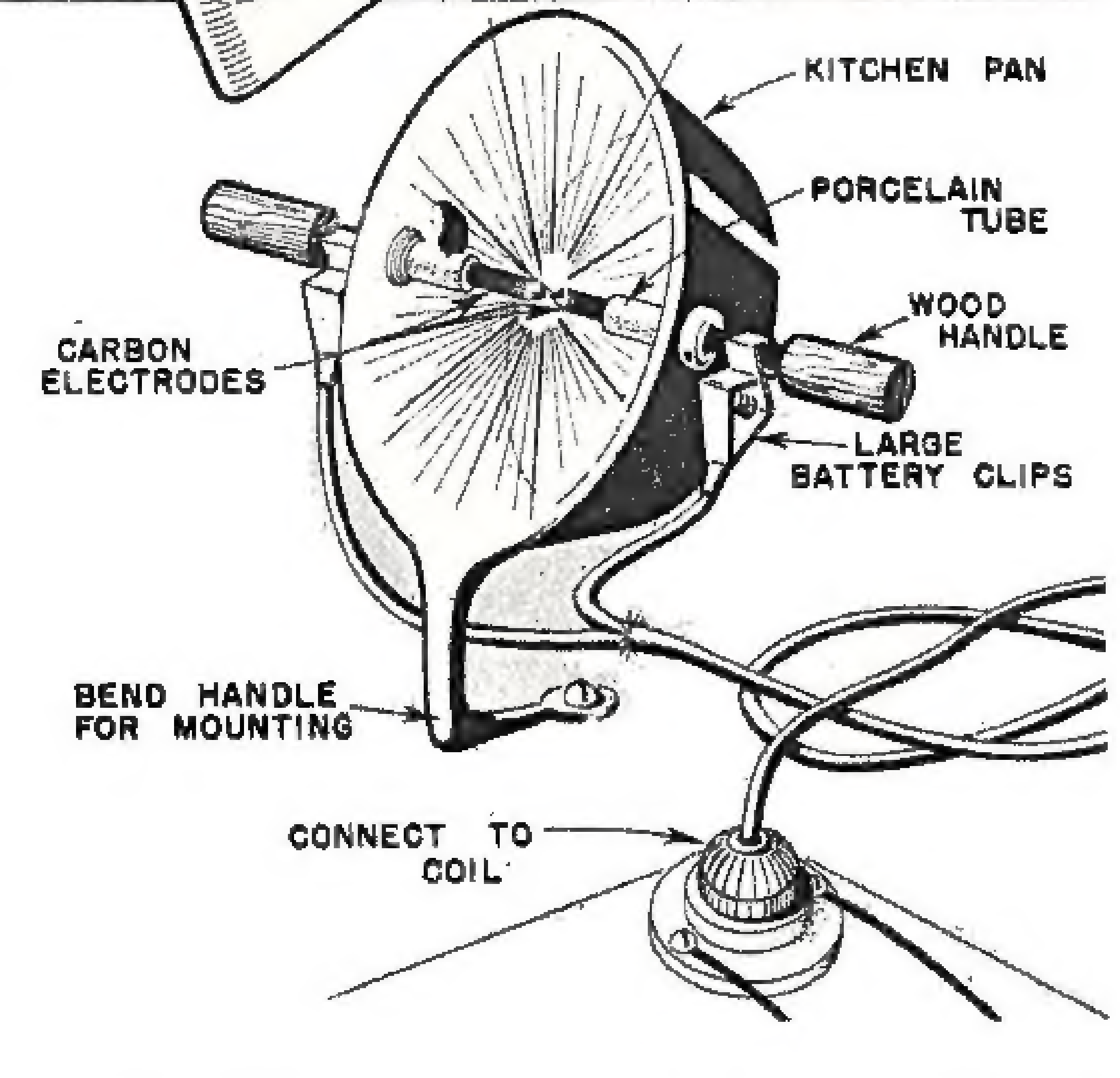

FIRE CLAY CRUCIBLE
LARGE BATTERY CLIPS
ARC LIGHT CARBON ELECTRODES
WOOD HANDLE
ELECTRIC FURNACE
CONNECT TO COIL

A handy electric furnace for melting small quantities of metal can be constructed as described in the above illustration. Mould the crucible from fire clay providing holes for inserting arc light carbons. When experimenting with furnace wear dark sun goggles.


LARGE OIL CAN WITH BOTTOM CUT OUT
ULTRA-VIOLET GLASS FILTER
RIVET SHIELD OVER VENT HOLES
SMOKED GLASS PEEP HOLE
METAL GUIDE
ASBESTOS PAPER OVER WOOD BASE
PORCELAIN TUBE AS USED BELOW
WOOD HANDLE
CARBON ELECTRODE
LARGE BATTERY CLIP
ASBESTOS PAPER GASKET
CONNECT TO COIL AS IN OTHER EXPERIMENTS

This ultra violet ray lamp reveals forged signatures, invisible inks and invisible acid etchings in metals. Fashion the lamp from a 5-gal. oil can mounted on an asbestos covered wooden base. A window holds a small pane of ultra violet filter glass through which the invisible rays pass. Carbon rods furnish arc.


WRAP A FEW TURNS OF WIRE AROUND THE TUBE TO HOLD IT IN PLACE


KITCHEN PAN
PORCELAIN TUBE
WOOD HANDLE
CARBON ELECTRODES
LARGE BATTERY CLIPS
BEND HANDLE FOR MOUNTING
CONNECT TO COIL

A pair of carbon electrodes or rods of ⅜″ diameter connected to the reactance coil and fitted in a reflector similar to the one shown here make a powerful spotlight. Porcelain insulators such as used in house wiring insulate carbons from reflectors.

Fighting Oil Well Fires

[*Continued from page* 61]

ways. Sometimes heavy tools, while being drawn out or, in some instances, blown from the well, create sparks as they bang against the casing pipe. Lightning may strike a well. But the exact cause is seldom known. Most who have been close enough to see the actual cause, have been killed.

A trained expert with special equipment is required to put out these wild torches. Kinley's usual method is to set off a charge of gelatinized nitroglycerin at the base of the blaze. It may be days before the shot can be fired at some fires. Red hot metal and debris first must be pulled out, away from the well. If not removed, this hot metal can easily re-ignite the gas.

Kinley's method, like the fire, is spectacular; but he is decidedly not a stunt man. He goes about his work with the careful strategy of a general in the midst of war. His work is war—a patient battle with Nature gone wild.

He has developed a system which includes a special fire truck, unique equipment and the help of trained assistants. Much of the equipment he designed, based on practical experience and needs, for he is mechanically inclined and has invented many practical devices in the oil fields. When he needs something that can do the job better he says he "just makes it."

He employs a five-man crew to clear away the debris. Two wear heavy asbestos suits, helmets, gloves and shoes, and work up close to the fire, rushing in and out of the terrific heat attaching grappling hooks to the hot metals. The hooks are connected by steel cables to a powerful high speed tractor, manned by a third member of the crew. Two more assistants, standing behind a movable shield, play a double stream of water over the ground near the mouth of the well and over the men working in the asbestos suits. Occasionally bad valves have to be yanked out "by the roots." No two fires are the same.

Finally comes the task of carrying the "gelatin" to the edge of the flame. Kinley prepares his own shot at his nitro wagon stationed a mile away from the well. He can estimate the size of the shot needed, which may range from five to 40 quarts, packed in a metal container of a special design with double walls with air space between, and wrapped with a layer of heavy asbestos. Every precaution is taken to protect the shot from the heat. Attached to the container is a strand of wire, used in firing the charge from the switch.

A final check on the equipment, and Kinley climbs into his asbestos suit, signals the hose crew, and starts toward the roaring flame in a leisurely walk, carefully picking his way over the muddy ground. Tucked under his arm is enough explosive to blow him to smithereens should he miss footing or the trailing wire snag and jerk the container from his grasp.

As though discussing some ordinary job, Kinley modestly admits:

"I have had narrow escapes. One never knows in this business. A wind might whip the flames around and then it's all over."

At the mouth of the well Kinley places the shot within a foot or two of the blaze and quickly retires to the switch 100 yards back. Down goes the plunger. A dull red glow appears near the fire. As sight is quicker than sound, the yellow flame disappears in the air a fraction of a second before the explosion is heard. However, the roar of the gas continues, for, when the force of the shot is dissipated the gas resumes its upward flow. But there is no fire. Kinley's work is not completed until he has connected the well with pipe lines or storage tanks, putting it in production.

All conceivable equipment is carried in the fire truck. A special pump for spraying the men and cooling the ground is mounted on the front of the motor. Other equipment consists of special nozzles and hose; several sets of asbestos suits, shoes and gloves; hardboiled helmets with heat-resisting glass windows; gas masks, inhalators, stretchers, first aid supplies, a complete set of specially designed non-sparking and heat-resisting tools, and oil-soaked cotton for the men to plug in their ears as a protection against the roar, vibration and explosion.

Because of the spectacle value of a burning oil well and the interest in Kinley's success, he recently gave a public demonstration at the International Petroleum Exposition at Tulsa. Natural gas was piped to an 80-foot wooden derrick in front of the grandstand.

To increase the pressure sufficient to produce a 60-foot blaze, gate valves on the open flow gas wells 60 miles away were opened. The normal gas flow on the main line is 25 pounds, reduced at the domestic meter to 4 ounces, or one-quarter pound. Opening the valves increased the main line pressure to 100 pounds, at which pressure it was delivered to the exhibition. The demonstration, lasting a little more than an hour, consumed 1,155,000 cubic feet of gas, or enough to supply the needs of ten homes for a year; the cost was about $1,000.

Prior to the adoption of Kinley's method of fighting fires, the most successful method was to smother the blaze with jets of steam and streams of mud. This system is still used on some blazes.

"What was the biggest single shot you ever used?" Kinley was asked.

"Eighty quarts," he replied. "That was on the big Tulsa Oil Company fire at Overton, Texas. The next biggest was about 45 quarts on the Sinclair Oil Company fire at Gladewater."

"Which was the hardest to handle?"

"They were both plenty tough. The gas pressure was so strong on the Overton blaze that the

[*Continued on page* 143]

YOU HAVEN'T A CHANCE, SIS JIM HATES GIRLS!
— JIM'S PIMPLY FACE MADE HIM BALKY ABOUT GOING PLACES
READ STORY
THAT GUY'S A REGULAR HERMIT I TELL YOU — JUST STICKS AROUND BY HIMSELF — WOULDN'T TAKE A GIRL OUT ON A BET...
IS THAT SO — WELL I'LL BET I CAN BREAK HIM DOWN. YOU WATCH—
NOT HURT ARE YOU — HERE — YOU'D BETTER LET ME HELP YOU OVER TO THE BANK
OOOH — OUCH — MERCY, I JUST C-CAN'T SEEM TO S-STAND UP ON THESE SKATES!
THANKS SO MUCH — YOU'RE JIM GREENE AREN'T YOU? I'VE HEARD MY BROTHER BOB TALK ABOUT YOU LOTS. WHY DON'T YOU EVER COME OVER WITH THE REST OF THE CROWD?
OH - I - ER I COULDN'T - THAT IS YOU SEE - I'M - ER - I'M NO GO AT SOCIAL STUFF
WELL, WELL, MISS CLEOPATRA, DIDN'T GET FAR THAT TIME — DID YOU?
H'MM — BOB, I BET I KNOW WHY HE ACTS STAND-OFFISH. IT'S HIS FACE. ALL THOSE PIMPLES. WHY DON'T YOU TELL HIM ABOUT FLEISCHMANN'S YEAST? YOU KNOW HOW IT HELPED YOU!
LATER
HERE — TRY THIS ONE!
WHO SAID JIM DOESN'T LIKE GIRLS?
O.K. SIS — I'LL EAT MY WORDS. YOU AND THOSE YEAST CAKES SURE HAVE WORKED WONDERS. JIM'S A NEW GUY SINCE THOSE PIMPLES LEFT HIM!
FLEISCHMANN'S YEAST
—clears the skin

Don't let Adolescent Pimples keep YOU from making new friends

• Countless boys and girls shun company and avoid "dates," because they hate to be seen with a pimply face.

After the start of adolescence—from about 13 to 25, or even longer—important glands develop and final growth takes place. The whole body is disturbed. The skin gets oversensitive. Waste poisons in the blood irritate this sensitive skin. Pimples result.

Fleischmann's fresh Yeast is helping thousands of young people to overcome adolescent pimples. It clears these skin irritants out of the blood. Pimples go. Eat 3 cakes daily—one before each meal—plain, or dissolved in a little water—until skin clears. Start today!

by clearing skin irritants out of the blood

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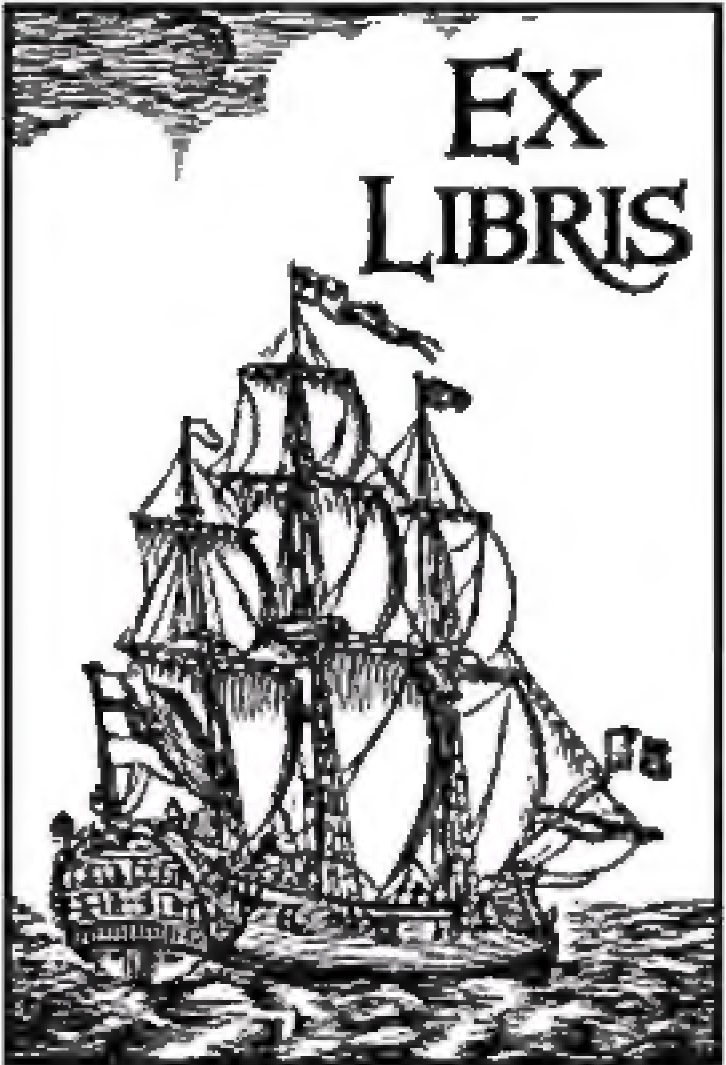

Anon. Malefactor